University of Alberta

Examining the Role of the Oncologist in Promoting Physical Exercise in Cancer Survivors

By

Lee Winston Jones

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A dissertation submitted to the Faculty of Graduate Studies and Research in partial fulfillment of the requirements for the degree of Doctor of Philosophy

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Lee Winston Jones
#119, 10717 83Av
Edmonton, AB
T6E 2E5

July 19 2002

University of Alberta

Faculty of Graduate Studies and Research

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled *Examining the Role of the Oncologist in Promoting Exercise in Cancer Survivors* submitted by *Lee Winston Jones* in partial fulfillment of the requirements for the degree of Doctorate of Philosophy.

Dr. Kerry Courneya (Supervisor)

Dr. John Spence

Dr. John Mackey

Dr. Ron Plontikoff

Dr. Cam Wild

Dr. Gaston Godin

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Abstract

The purposes of this dissertation was to examine the role of the oncologist in promoting exercise to cancer survivors (study one) and second to determine the influence of an oncologist-based recommendation on exercise motivation in cancer survivors (study two). The participants of study one were 311 breast, prostate, colorectal, and lung cancer survivors in a retrospective design. Study one investigated, the percentage of cancer survivors who reported discussing exercise with their oncologist during a cancer consultation, the effect of these discussions on normative beliefs and exercise behavior, and the preferences of cancer survivors for discussing exercise with their oncologist. Results indicated that 28% of oncologist's initiated discussions on exercise during treatment consultations and that cancer survivors who reported that their oncologist discussed exercise during their consultation reported more exercise during adjuvant treatment than survivors who reported that exercise was not discussed. Finally, 82% of respondents reported that they would prefer their oncologist to initiate a discussion of exercise during treatment consultations.

Research questions in study two were examined using 300 newly diagnosed breast cancer survivors in a prospective randomized controlled trial. This study investigated the effects of an oncologist-based recommendation on exercise levels in breast cancer survivors. Specifically, the effects of two interventions were compared to the conventional standard of treatment and with

each other on self-reported exercise behavior and Theory of Planned Behavior variables. Preplanned analyses indicated that an oncologist recommendation had minimal effects on exercise behavior but strong effects on important theoretical determinants of exercise. Ancillary analyses supported earlier findings that a perceived oncologist recommendation may have promising short effects on exercise behavior outcomes. Results also suggested that some exercise behavior outcomes were mediated by TPB variables.

Overall, the findings of this dissertation suggest that the oncologist can play a promising role in promoting exercise to cancer survivors. Moreover, it appears that cancer survivors are very interested in receiving and are motivated to comply with such advice during adjuvant therapy. Results of this dissertation were discussed in terms of the future clinical practice implications for cancer care, theory-based interventions, and physician-based exercise counseling interventions.

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I would like to dedicate this thesis to the people in my life who have made this whole process possible:

My mum, dad, and big sis. Words cannot describe how much you mean to me. Your warmth, love, support and dedication to me and each other is a constant source of inspiration, I can only hope that I can be as successful in my life as you have been in yours.

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Chapter One

General Introduction

Cancer Statistics

Cancer is now a disease of epic proportions. Globally, there were an estimated 10.1 million new cases, 6.2 million deaths, and 22.4 million persons living with cancer in the year 2000. This represents an increase of around 22% in incidence and mortality since 1990, on average there is about a 10% chance of developing cancer before age 65 (Parkin, Bray, Ferlay, & Pisani, 2001). In Canada, cancer is now the second most common cause of death, with an expected 65,300 deaths and 134,100 new cases in 2001 (Canadian Cancer Society, 2001). Canadians have an approximate 1 in 3 lifetime risk of developing cancer and a 1 in 4 lifetime risk of dying from cancer. Over the past decade, early detection and improved therapies have resulted in reduced mortality rates; moreover, the relative survival rate for all cancers combined is now approximately 60% (American Cancer Society, 2002).

Cancer and Quality of Life

Following a cancer diagnosis, the comprehensive cancer team devises an appropriate course of action usually involving local and adjuvant therapies (Shapiro & Recht, 2001). Unfortunately, these conventional therapies may be associated with physical and psychological morbidity that can significantly diminish quality of life (QOL) (Maunsell, Drolet, Brisson, Robert, & Deschenes, 2002). Radiation therapy is a local-regional treatment that can present several clinical

manifestations including cardiac toxicity, lymphedema, and fatigue (Dimeo, 2002; Shapiro & Recht, 2001; Vallis, Pintilie, Chong, Holowaty, Douglas et al., 2002). Chemotherapy is a treatment for advanced solid tumors and considered the most debilitative of all conventional adjuvant therapies. Cancer survivors often report nausea, vomiting, fatigue and weight gain as common symptoms, although cardiac toxicity, bone/muscle pain, reduced white-cell count and infection are not uncommon in survivors receiving this modality (Shapiro & Recht, 2001).

Cancer, Quality of Life and Exercise

Currently there are a number of pharmacological (e.g., anti-depressants, stimulants) and non-pharmacological interventions (e.g., cognitive-behavioral therapies, individual counseling, social support, and other alternative treatments) designed to alleviate these adverse symptoms and ultimately enhance survivors QOL. Despite the widespread implementation of such interventions, the benefits of these modalities on patients QOL are modest (Fawzy & Fawzy, 1995 Meyer & Mark, 1995; Goodwin, Leszcz, Ennis, Koopmans, Vincent, et al., 2001). Consequently, there is a need to examine new effective approaches in the management and augmentation of QOL in cancer survivors. Over the past few years increased attention has been focused on physical exercise as a rehabilitative intervention for cancer survivors before, during, and after cancer treatment (Courneya & Friedenreich, 2001). In fact, a considerable number of studies have emerged assessing physical exercise as a potential QOL intervention

strategy (Mock, Pickett, Ropka, Muscari, Stewart, et al., 2001; Segal, Evans, Johnson, Smith, Colletta, et al., 2001). Overall, the results of these studies suggest that physical exercise can improve cardiopulmonary fitness and quality of life and reduce a variety of debilitative symptoms associated with cancer and its treatments. In fact, a recent comprehensive review of 36 studies published between 1980 and 2000 revealed that 80% of all studies reported statistically significant positive results when assessing physical exercise and multiple QOL outcomes (Courneya, Mackey, & Jones, 2000). Specifically, physical exercise had positive effects regardless of the exercise intervention/participation (type, duration, frequency, and intensity of exercise), cancer site, treatment protocol, and stage of cancer diagnosis/rehabilitation.

Cancer and Exercise Adherence

Despite the demonstrated benefits of physical exercise as an intervention designed to alleviate the adverse symptoms of cancer and its treatments, rates of physical exercise among cancer survivors are low (see Appendix A). Research has suggested that physical exercise levels decline during cancer treatments and may not return to their pre-diagnosis levels (Courneya & Friedenrich, 1997a; Courneya & Friedenrich, 1997b; Demark-Wahnefried, Hars, Conaway, Havlin, Rimer, et al., 1997; Dimeo, Rumberger, & Keul, 1998; Keats, Courneya, Danielson, & Whitsett, 1999). Like most behavioral interventions, the benefits of exercise can only be attained through regular participation.

Exercise adherence is a difficult challenge for healthy adults and is likely even more difficult after a cancer diagnosis and during intensive medical treatments (Courneya & Friedenreich, 1997a; Courneya & Friedenreich, 1997b; Demark-Wahnefried, Hars, Conaway, Havlin, Rimer et al., 1997). These assumptions have been confirmed by several reports. Courneya and associates (1997a; 1997b) found that only 37% of colorectal cancer survivors and 28% of breast cancer survivors exercised regularly during treatment. Moreover, Wyatt and colleagues (1999) found that only 16% of older cancer survivors were active during treatment. There are numerous determinants of exercise behavior during cancer treatment including physical symptoms (Vallis, Pintile, Chong, Holowaty, Douglas et al., 2002; Schwartz, 1998), lack of time (Leddy, 1997), social cognitive beliefs (Courneya & Friedenreich, 1997a; Courneya and Friedenreich, 1997b; Courneya,Friedenreich, Arthur, & Bobick, 1999) and lack of an oncologist recommendation (Demark-Wahnefried et al., 2000; Young-McCaughan & Sexton, 1991).

Physician-Based Exercise Interventions

Despite the low adherence rates, no study to date has attempted to increase exercise levels in cancer survivors. Over the past decade, researchers have adopted a number of interventions (e.g., self-monitoring, decisional balance, reinforcement strategies, relapse prevention) in an attempt to increase exercise levels in sedentary individuals (cf. Dishman & Buckworth, 1996; van der Bij,

Laurant, & Wensing, 2002). The results of these studies have been somewhat inconsistent, however one approach that has found consistent effects is physician-based exercise counseling (Petrella & Lattanzio, 2002; Simons-Morton, Calfas, Oldenburg, & Burton, 1998). In recent years, primary care physicians and other health care providers have been encouraged to promote physical exercise as part of primary care (Chakravarthy, Joyner, Booth, 2002; Ford, Giles, Dietz, 2002; Harris, Caspersen, DeFriese, & Estes, 1989; Myers, Prakash, Frolelicher, Do, Partington, & Atwood, 2002; Year 2010 Health Objectives, 1997) (see Appendix B). As a result, several research initiatives have emerged (e.g., Project PACE, Project PAL, Green Prescriptions, Project ACT) examining the effect of physician-based exercise counseling on exercise levels in sedentary, healthy individuals. A comprehensive review revealed a total of 16 intervention studies, all published between 1979 and 2001.

In summary, most of these studies (e.g., Bull & Jamrozik, 1998; Calfas et al., 1996) examined healthy, middle-aged, sedentary adults, with only three studies examining patients over the age of fifty years (Damush, Stump, Saporito, & Clark, 2001; Goldstein, Pinto, Marcus, Lynn, Jette et al., 1999; Marcus, Goldstein, Jette, Simkin-Silverman, Pinto et al., 1997). The majority of studies have been randomized clinical trials (e.g., Stevens, Hillsdon, Thorogood, & McArdle, 1998; Lewis & Lynch, 1993), with only two studies being quasi-experimental in design (Calfas et al., 1996; Logsdon, Lazaro, & Meier, 1989). The relative sample sizes

of the studies were large and ranged from 44 (Marcus et al., 1997) to 4,195 (Burton, Paglia, German, Shapiro, & Damiano, 1995), with the average study recruiting approximately 500 sedentary patients (e.g., Swinburn, Walter, Arroll, Tilyard, & Russell, 1998; Harland, White, Drinkwater, Chinn, Farr et al., 1999). The intervention protocols largely consisted of 3 to 5 minutes of individualized exercise counseling, mainly promoting moderate intensity exercise, followed by the distribution of an educational hand-out, and follow-up phone calls placed systematically throughout the intervention period (e.g., Bull & Jamrozik 1998; Green, McAfee, Hindmarsh, Madsen, Caplow, et al., 2002; Lewis & Lynch, 1993). In the majority of studies the physician provided the exercise counseling (e.g., Goldstein et al., 1999; Bull & Jamrozik, 1998), although a health care provider (Cupples & McKnight, 1994) and an exercise development officer (Stevens et al., 1998) were also sources of exercise advice.

Several studies also incorporated psychological behavior change theory, stage of exercise readiness matched interventions (Calfas et al., 1996; Goldstein et al., 1999; Graham-Clarke & Oldenburg, 1994; Harland et al., 1999; Marcus et al., 1997) and social-cognitive theory (Simons-Morton, Blair, King, Morgan, Applegate et al., 2001) into their exercise counseling protocols in an attempt to maximize the effectiveness of the physician advice within a short time period and minimize the amount of physician training required to deliver the appropriate exercise prescription. Outcome measures included level of exercise (e.g., Marcus

et al., 1997; Lewis & Lynch, 1993; Calfas et al., 1996), stage of exercise readiness (e.g., Marcus et al., Goldstein et al., 1999; Calfas et al., 1996), quality of life (Goldstein et al., 1999), self-efficacy (Goldstein et al., 1999), attendance at an exercise class (Damush, Stump, Saporito, & Clark 2001) and $V0^2_{max}$ (Simons-Morton et al., 2001). The length of patient follow-up ranged from 1 month (Lewis & Lynch, 1993) to 24 months (Simons-Morton et al., 2001).

Overall, the review indicated that 9 of the 16 published intervention studies reported statistically positive results for intervention subjects when assessing physician-based exercise delivery and multiple outcomes (e.g., exercise level, stage of exercise readiness, V02 max) (Bull & Jamrozik, 1998; Calfas et al., 1996; Cupples & McKnight, 1994; Harland et al., 1999; Lewis & Lynch, 1993; Logsdon et al., 1989; Simons-Morton et al., 2001; Stevens et al., 1998; Swinburn et al., 1998). Furthermore, 5 studies showed a modest association between physician-based counseling and exercise outcomes (Damush et al., 2001; Goldstein et al., 1999; Graham-Clarke & Oldenburg, 1994; Kelly, 1988; Reid & Morgan, 1979), while only 2 studies reported no change in exercise outcomes between subjects who received exercise counseling and those who received the normal standard of care (Burton et al., 1995; Marcus et al., 1997).

Previous research has highlighted several important barriers (e.g., time, lack of knowledge, lack of support staff) that may prevent physicians from counseling their patients about the benefits of regular physical exercise (Bull et al.,

1995; Long et al., 1996; Pinto, Goldstein, DePue, & Milan, 1998; Swinburn et al., 1997). Consequently, research investigating physician-based exercise counseling has adopted a number of different intervention approaches and research designs in an attempt to overcome the aforementioned barriers and to provide a feasible intervention to increase exercise levels in previously sedentary individuals. Despite the implementation of sophisticated research protocols, lack of time and other associated barriers are consistently identified as the predominant factors preventing exercise counseling in the medical setting (Long, Calfas, Wooten, Sallis, Patrick et al., 1996; Swinburn et al., 1998). Furthermore, recent research has suggested that physicians may not strongly endorse the integration of physician-based exercise interventions into daily office practice (Pinto et al., 1998). Therefore, recent physician-based counseling trials have started to explore alternative methods of exercise advice delivery while maintaining the distinct advantages of the medical practice setting. A number of studies have adopted a medical practice approach to exercise counseling. Specifically, the physician provides a brief exercise recommendation and refers the patient to an exercise specialist/health professional to obtain detailed advice and further counseling on exercise (e.g., Damush et al., 2001; Simons-Morton et al., 2001; Stevens et al., 1998).

Physician-Based Exercise Interventions and Cancer

There is now a wealth of literature that has examined the effectiveness of

physician-based counseling on exercise behavior among sedentary, healthy individuals in various medical settings. However, no study to date has assessed if oncologist-based exercise counseling can have similar effects in cancer survivors. Careful review of several studies have indicated that many physicians and health professionals fail to counsel cancer survivors about the benefits of physical exercise and may conversely encourage rest and inactivity (Cooper, 1995; Demark-Wahnefried, Peterson, McBride, Lipkus, & Clipp, 2000; Segar, Katch, Roth, Weinstein-Garcia, Portner et al., 1998; Schwartz, 1998; Young-McCaughan & Sexton, 1991). Unfortunately, such advice may actually reduce physiological and psycho-social status of survivors thus, augmenting the debilitating effects of cancer and its treatments (MacVicar, Winningham, & Nickel, 1989). These findings may reflect the lack of methodologically rigorous studies demonstrating positive exercise effects on cancer and survival end-points and important barriers (e.g., knowledge, time) that may restrict oncologists from counseling or recommending physical exercise during treatment consultations. Despite these findings, the cancer treatment consultation may provide an excellent opportunity to deliver exercise information and offer similar advantages to medical settings in healthy populations. Indeed, several reports have indicated that cancer survivors are extremely motivated to initiate lifestyle and behavioral changes in the period following diagnosis and initial treatments (Demark-Wahnefried, Peterson, McBride, Lipkus, & Clipp, 2000; Jones & Courneya, in press; Lee, Lin, & Wrensch, 2000;

Maunsell, Drolet, Brisson, Robert, & Deschenes, 2002; Pinto, Maruyama, Clark, Cruess, Park, et al., 2002) and receiving this information may influence their attitudes and intentions to engage in exercise (Courneya, Blanchard, & Laing, 2001; Courneya & Friedenreich, 1999; Courneya et al., 1999; Segar et al.,1999).

Physician-Based Exercise Interventions, Cancer and Behavioral Theory

In recent years, researchers have started to acknowledge the value of using behavioral theory as the basis of their interventions (National Institutes of Health, 1997). There are currently many behavioral theories available to help design and evaluate theoretically driven exercise interventions. One of the earliest models is Rotter's Social Learning Theory (Rotter, 1954; Rotter, 1982). The four concepts in social learning theory are behavior potential, expectancy, reinforcement value, and the psychological situation. The basic tenet of social learning theory is that the potential for a behavior to occur in a specified situation is a function of the expectation that the behavior will lead to reinforcement in that situation and the value of reinforcement in that situation (Rotter, 1982). The Health Belief Model (Rosenstock, 1966, Rosenstock, 1974) was originally proposed to understand individual undertakings of health screening behaviors (Rosenstock, 1990). The four major components of the health belief model are perceived susceptibility to the disease state, perceived severity of the disease state, perceived benefits of a particular course of action, and perceived barriers to that course of action.

Perceived susceptibility refers to an individual's perception of the likelihood

probability of contracting the disease. Perceived severity refers to an individual's feelings concerning the seriousness of the disease in terms of contraction or nontreatment. The concept of perceived benefits focuses on the individual's perception that a particular health action will prevent or address the illness condition. Conversely, perceived barriers focuses on any possible negative effects of taking the health action including health side effects, financial expense, and time commitment.

The TTM (Prochaska & DiClemente, 1983) is a general model of intentional behaviour change and was originally developed to explain or predict change in addictive behaviours (i.e., smoking cessation). The model focuses on the dynamic nature of health behaviour change and postulates that behaviour change is likely to occur through a series of interrelated stages. Stages are both stable and dynamic in nature. That is, stages can last over considerable periods of time but are still open to change. The stages are as follows: pre-contemplation (PC), contemplation (C), preparation (PR), action (AX), maintenance (MN) and termination (TN). Research has shown that movement through the stages occurs in a cyclical manner at behaviour change before reaching termination. In the process those individuals may recycle back through the various stages (e.g. relapse while in action and move back to contemplation) (Marcus & Simkin, 1994).

The protection motivation theory (Rogers, 1983) was designed to explain fear-appeal communications. The original model identified three cognitive

appraisal processes: perceived severity, perceived vulnerability, and perceived effectiveness of an alternative response in preventing the occurrence of the threat (response efficacy). A recent revision of the theory added self-efficacy expectancy as a fourth predictor. Currently, the PMT is viewed not as a model of the effects of fear appeals, but as a model of health threats (Robberson & Rogers, 1988).

Another well-researched social cognitive model of expectancy value is the Theory of Planned Behavior (TPB) (Ajzen, 1991). The TPB proposes that behavioral intention is the proximal determinant of future behavior. The model further proposes that intention is influenced by three conceptually independent constructs: attitude, subjective norm, and perceived behavioral control. Attitude is the individuals' favorable or unfavorable evaluation of the behavior in question, whereas subjective norm reflects the perceived social pressure to perform or not to perform the behavior. Finally, perceived behavioral control reflects a person's perception of the ease or difficulty of performing the behavior. Empirical reviews of the TPB have confirmed the efficacy of this model in the prediction and understanding of various health behaviors including exercise in cancer survivors (Armitage & Connor, 2002; Montano, Kasprzyk, von Haeften, & Fishbein, 2001; Fishbein, 2001; Godin, Gagne, Maziade, Moreault, Beaulieu, & Morel, 2001; Rhodes & Courneya, in press).

To date, previous research initiatives have had relatively little success in changing targeted social-cognitive concepts using theoretically driven exercise

interventions (Baranowski, Anderson, & Carmack, 1998; Sallis, 2001). To address this problem, researchers have suggested using theory-based information in the development and implementation of behavior change interventions (Ajzen, 2002a; Fishbein, 2001). Specifically, data from theoretical questionnaires can identify individuals' salient and specific beliefs towards a given behavior that can be targeted in a subsequent intervention.

Purposes of the Present Dissertation

Therefore, the role of the oncologist in promoting exercise in cancer survivors was determined using two sequential investigations. Study one examined and confirmed the role of the oncologist in promoting exercise in cancer survivors and provided critical information that could be targeted in study two. Based on this information, study two examined the influence of an oncologist's recommendation on exercise motivation in newly diagnosed breast cancer survivors in a randomized controlled trial.

Chapter Two

Study One

Examining the Role of the Oncologist's in Promoting Exercise in Cancer Survivors

Introduction

A cancer diagnosis is often an extremely stressful period for cancer survivors, their families, and support networks. Worries regarding diagnosis, treatment, and future recurrence can cause significant physical and psychological morbidity among newly diagnosed cancer survivors (Maunsell et al., 2002). During the initial treatment period, survivors and their families will be exposed to a number of supportive services (e.g., group therapy, nutritional advice, social services) designed to help survivors cope with their diagnosis, treatments, and maximize their quality of life. Despite the referral of cancer survivors to various supportive services, rehabilitative physical exercise programs are not offered as part of comprehensive cancer care.

Discussion of Exercise During Cancer Treatment Consultations

Previous research has suggested that approximately 60-70% of cancer patients report receiving inadequate information from their physician/health-care provider regarding the benefits of physical exercise (Demark-Wahnefried et al., 2000; Cooper, 1995; Young-McCaughan & Sexton, 1991). Denmark-Wahnefreid and colleagues found that only 33% of patients reported receiving a recommendation from their physician to exercise. These results were corroborated by Cooper (1995) who found 70% of breast cancer survivors reported receiving little or no information from their physician regarding physical exercise. Other studies have reported similar findings (Durak, Lilly, & Hackworth, 1999;

Leddy, 1997) (See Appendix A).

Research in healthy populations has suggested that approximately only 30-40% of healthy patients report that they regularly receive exercise counseling/advice from their general or primary care physician (See Appendix A). Glasgow and colleagues (2001) found that only 28% of respondents reported receiving physician advice to increase their exercise levels. Another study (Wee, McCarthy, Davis, & Phillips, 1999) found that only 34% of patients reported being counseled about exercise during their last medical visit. Women, older, patients of higher incomes, and patients with cardiovascular risk factors were more likely to be counseled about exercise. Conversely, Weingarten and colleagues. (1995) found that over 69% of patients reported receiving exercise counseling from their physician. Furthermore, this figure seems to rise considerably when patients have symptoms that may directly benefit from physical exercise (e.g., obesity, hypertension, etc). One study (Freidman, Brownson, Peterson, Wilkerson, 1994) assessed whether patients had been advised by their physician in the past year to reduce chronic disease risk factors. Only 15% of respondents reported being told by their physician to exercise more. Interestingly, 42% of smokers and 43% of overweight respondents reported being told to stop smoking or lose weight by their physicians.

Preferred Discussion of Exercise During Cancer Treatment Consultations

While it is important to establish current exercise counseling practice by

oncologists, it is also important to assess whether cancer patients desire their oncologist to advise them about the benefits of physical exercise during treatment consultations. To date only one study has assessed cancer patients' interest in health promotion programs (including physical exercise). Denmark-Wahnefreid and associates (2000) revealed that 50-60% of breast and prostate cancer patients expressed high levels of interest in receiving information regarding diet and exercise programs. Furthermore, the majority of respondents indicated that they would like this advice within the first 6 months of diagnosis.

A number of researchers have assessed patient expectations of exercise advice by health care professionals in healthy populations (see Appendix A). Price, Desmond, and Losh (1991) assessed patients' perceptions of the physician's role in providing 20 health promotion issues (e.g., yearly prostate exams, drug problems, financial problems, exercise, etc). The results indicated that 36% of patients thought physicians should assist all patients who ask for exercise advice and 51% thought they should counsel everyone that needs physical exercise advice. Interestingly, 11% of respondents thought physicians should refer patients to an exercise specialist. Only 2% of 382 patients' thought that their physicians should not be involved in exercise counseling. Further research by Kravitz and his associates (1994) indicated that 38% of patients thought exercise/diet counseling was definitely or probably necessary during office visits. However, the results also indicated that 36% of patients thought exercise/diet counseling to be definitely or probably unnecessary. A further 26%

were uncertain of the need for exercise/diet counseling in the medical consultation.

Effects of Exercise Discussions During Cancer Treatment Consultations

If patients were to receive exercise counseling in the medical/radiation oncology consultation would this counseling be effective? Some preliminary research suggests that the role of health care providers in promoting exercise for cancer survivors may be important. For example, Segar et al. (1999) found that breast cancer survivors who received a physician recommendation to exercise reported significantly more exercise than those who did not receive such a recommendation. Moreover, in a series of studies based on Ajzen's (1991) theory of planned behavior (TPB), Courneya and colleagues found that perceived physician approval/support for exercise (a "normative belief" in TPB terms) correlated positively with cancer survivors' subjective norm (Courneya et al., 2001; Courneya & Friedenreich, 1999; Courneya et al., 1999), intention (Courneya & Friedenreich, 1999), self-reported exercise (Courneya & Friedenreich, 1999) and objective exercise measured by attendance at a structured fitness class (Courneya & Friedenreich, 1999).

In summary, the literature reviewed suggests that only 30-40% of cancer survivors receive a recommendation from their physician/healthcare provider to participate in physical exercise. This low figure is particularly important given the fact that the majority of survivors are interested in receiving information from their physician regarding physical exercise and are motivated to follow this advice. Furthermore, it also appears that a positive recommendation from their physician

can have a significant impact on cancer survivors' attitudes and intentions to engage in physical exercise.

Despite the promising results of these studies, however, there are important limitations that preclude us from drawing any definitive conclusions at this time. First, and most important, all of these studies have used the term physician and/or health care provider when soliciting information from cancer survivors (e.g., Courneya et al., 2001; Courneya et al., 1999; Cooper, 1995). The term physician may refer to a variety of individuals for cancer survivors (e.g., family physician, referring physician, surgeon, oncologist) and the term health care provider is even more ambiguous (e.g., physicians, nurses, physiotherapists, radiotherapists). Consequently, it is unclear what the role of the oncologist might be in promoting exercise in cancer survivors. A second limitation is that none of the studies was designed to specifically focus on the role of the physician/health care provider in promoting exercise. As a result, each study was limited to a single question on the topic such as "did your physician/healthcare provider recommend exercise to you". Third, each of the studies only asked whether the physician/health care provider recommended exercise, but it was never determined who initiated the discussion (i.e., the physician or the survivor). This information is important to help determine if the physician/health care provider is taking a proactive role in promoting exercise to cancer survivors or simply responding to survivors' requests. Fourth, no study reported on cancer survivors' preferences for being counseled by the oncologist. Consequently, it is not known if cancer survivors themselves would actually prefer

to be counseled about exercise by the oncologist. Finally, there is no information on the medical or demographic determinants of either actual or preferred exercise discussion with oncologists.

Purpose of Present Study

The overall objective of study one was to specifically examine the role of the oncologist in promoting physical exercise in cancer survivors. Specific objectives were to determine: (a) the percentage of cancer survivors who report a discussion of physical exercise with their oncologist during a treatment consultation, (b) the percentage of exercise discussions that were oncologist-initiated versus survivor-initiated, (c) the association of these discussions on subsequent normative beliefs and exercise behavior, (d) the medical and demographic factors influencing oncologist- and survivor-initiated exercise discussions during treatment consultations, (e) the preferences of cancer survivors for discussing exercise with their oncologist during treatment consultations, and (f) the medical and demographic factors associated with cancer survivor preferences for oncologist- versus survivor-initiated exercise discussions during treatment consultations. Specific hypotheses were: (a) the majority of cancer survivors will not have discussed exercise with their oncologist, (b) those who did discuss exercise with their oncologist will report a stronger normative belief and greater exercise participation during their cancer treatments, and (c) the majority of cancer survivors will demonstrate a preference for having exercise discussions with their oncologist. The percentage of discussions that would be oncologist- versus

survivor initiated or the medical/demographic determinants of actual and preferred discussions was also explored in this study.

Method

Participants

Participants were 311 persons diagnosed with prostate, breast, colorectal, or lung cancer between July, 1999 – July, 2000 in Alberta, Canada, and had visited an oncologist for a treatment consultation. These four cancers were selected because they account for over 50% of all cancer cases and deaths in Canada and the United States (American Cancer Society, 2002; Canadian Cancer Society, 2001).

Design and Procedures

Using a retrospective design, cancer survivors were asked to recall what psychosocial and behavioral issues were discussed during their treatment consultations and also the amount of exercise they did during their treatments. Eligible participants were identified through the Alberta Cancer Registry and then physician approval to contact survivors was pursued. A total of 210 physicians representing 845 cancer survivors were contacted. Of these 210 physicians, 125 (59%) provided active approval to contact the 596 survivors that they represented. The most common reason for not obtaining physician approval was failure to contact the physician after multiple attempts. Each of the 596 potential participants was then sent a questionnaire package in November/December 2000 that contained a detailed cover letter, two copies of an informed consent form (See Appendix C), a questionnaire (See Appendix D), and a stamped, self-addressed

return envelope. Survey methods known to increase response rates were used including multiple reminders (i.e., postcard, second questionnaire), stamped return envelopes, personalized cover letters, colored paper, assurances of confidentially, and university sponsorship (Dillman, 1983). Of the 596 questionnaires that were mailed, 16 were returned unopened (10 had moved and 6 were deceased) and 311 were returned completed, resulting in a response rate of 54% (311/580).

Instruments

The study instrument was adapted from previous research investigating exercise behavior in breast cancer survivors (Courneya et al., 2001; Courneya & Friedenreich, 1999). Furthermore, the instrument was pilot tested in an initial mail-out to 25 cancer survivors in these studies. Finally, the questionnaire took approximately 10-15 minutes to complete and was worded at an appropriate reading level for cancer survivors (Grade 8) (See Appendix D).

Background Information

Demographic (e.g., age, sex, marital status, education, income, employment status) and medical (e.g., type of cancer, months since cancer diagnosis, stage of disease, length and type of treatment protocol) variables were assessed by self-report.

Actual and Preferred Exercise Discussions During Treatment Consultations

Participants were asked what psychosocial and behavioral issues were discussed and which ones they would have preferred to have been discussed during their treatment consultation. Eight other psychosocial and behavioral issues besides exercise were included to try and disguise the purpose of our study and also for comparison purposes. The first question stated "Which of the following issues were discussed during your consultations with your oncologist?" The nine psychosocial and behavioral issues were: (a) psychological issues (e.g., anxiety), (b) social issues (e.g., family concerns), (c) smoking status, (d) nutritional advice, (e) weight control, (f) exercise, (g) alcohol intake, (h) spiritual issues, and (i) sexuality issues. The three options for each psychosocial and behavioral issue were: (1) discussion initiated by the oncologist, (2) discussion initiated by you, and (3) not discussed. If participants reported that the issue was discussed (either oncologist- or survivor-initiated), they were then asked if they were referred to a specialist (response options of "Yes" or "No"). The second question on preferences was: "Which of the following issues would you have liked to have been discussed during your consultation with your oncologist?" with the three response options being (1) should be initiated by the oncologist, (2) should be initiated only by you, and (3) should not be discussed. Similarly, if respondents reported that the issue should be discussed, they were then asked if the oncologist should refer them to a specialist (Yes or No).

Normative Belief

Normative Belief from the TPB (Ajzen, 1991) was measured by three items rated on 7 point scales that ranged from 1 (strongly disagree) to 7 (strongly agree). An evaluation of these items in previous related studies demonstrated acceptable validity and reliability (.85 - .95) (Courneya et al., 2001; Courneya & Friedenreich, 1999). The items were: (1) "It is clear to me that my oncologist thought I should have participated in regular physical exercise during my cancer treatment", (2) "I think my oncologist would have approved of me exercising regularly during my cancer treatment", and (3) " My oncologist encouraged me to exercise regularly during my cancer treatment". Internal consistency for this three item scale was acceptable (α = .74).

Exercise Behavior

Exercise Behavior was assessed by the leisure score index (LSI) of the Godin Leisure-Time Exercise Questionnaire (Godin, Jobin, & Bouillon, 1986; Godin & Shephard, 1985). The LSI contains three questions that assessed the average frequency of mild, moderate, and strenuous exercise during free time in a typical week. We modified the LSI so that average duration was also provided. An independent evaluation of this measure found its reliability and validity to compare favorably to nine other self-report measures of exercise based on various criteria including test-retest scores, objective activity monitors, and fitness indices (Jacobs, Ainsworth, Hartman, & Leon, 1993). In the present study, participants were asked

to recall their exercise levels during the total span of their cancer treatment. We computed separate scores for frequency and minutes of mild, moderate, strenuous, and total exercise as well as total LSI (i.e., 3 METS x mild frequency + 5 METS x moderate frequency + 9 METS x strenuous frequency). For descriptive purposes, we also computed the percentage of participants who met the American College of Sports Medicine's (1998) guidelines of accumulating at least 30 minutes of moderate/strenuous intensity exercise on most (i.e., 5) days per week (i.e., at least 150 minutes of moderate/strenuous intensity exercise per week).

Results

Demographic and Medical Information

Details of the demographic and medical profile of the participants are presented in Table 1-1. In summary, participants' age ranged from 31 to 81 years (M=60.92, SD=11.49), 59% were female, 76% were married, and 46% had completed university/college. Medical information indicated that 52% were diagnosed with breast cancer, 30% with prostate cancer, 13% with colorectal cancer, and 6% with lung cancer. Also, 77% were stages I or II, 75% had surgery, 39% had chemotherapy, and 66% had radiation therapy. Finally, time since diagnosis ranged from 3.0 to 29.0 months with a mean of 10.51 (SD=3.89).

Table 1-1

Demographic and Medical Profile of Study Participants

Variable	n	%
Sex (n = 303)		
Male	124	40.9
Female	179	59.1
Marital Status (n = 300)		
Married/common law	237	79.3
Divorced/separated/widowed/never married	63	21.0
Education (n = 293)		
Some high school	63	21.5
Completed high school	78	26.6
Completed/some university/college	103	35.2
Some/completed graduate school	49	16.7
Annual family income (n = 262)		
<$20,000	51	19.5
$20,000-$39,000	60	22.9
$40,000-$59,000	61	23.3
$60,000-$79,000	42	16.0
$80,000-$99,999	21	8.0
>$100,000	27	10.3
Employment Status (n = 302)		
Retired	135	44.7
Full time	83	27.5
Homemaker	35	11.6
Unemployed	9	3.0
Part time	40	13.2
Tumor Site (n = 303)		
Prostate	91	30.0
Breast	157	51.8
Colorectal	38	12.5
Lung	17	5.6
Stage (n = 233)		
I	97	41.6
II	84	36.0
III/IV	52	22.3

Yes	228	75.3
No	75	24.7
Chemotherapy (n = 297)		
Yes	116	39.1
No	181	60.9
Radiation (n = 293)		
Yes	196	66.0
No	101	34.0

Actual Discussion of Exercise During Treatment Consultations

In summary, 28.4% of survivors reported that their oncologist initiated a discussion, 13.9% reported initiating the discussion themselves, and 57.8% reported that the issue was not discussed (Figure 1-1). Of the 42.3% of cancer survivors who reported a discussion of exercise, 13.6% of those indicated that they were referred to a specialist. Concerning psychological, smoking, and nutrition issues, 35.4%, 37.4%, and 25% of survivors reported that their oncologist initiated a discussion, 11.2%, 5.2%, and 15.8% reported initiated the discussion themselves, and 53.4%, 57.4% and 59.2% respectively, reported that the issue was not discussed. Furthermore, 22.3%, 4.9%, and 21.6% of survivors indicated that they were referred to a specialist for these issues (Table 1-2).

Compared to all other psychosocial and behavioral issues listed, physical exercise ranked 4th in terms of being initiated by the oncologist, 2nd in terms of being initiated by the survivor, and 7th in terms of not being discussed at all. Finally, physical exercise ranked 7th for being referred to a specialist when it was discussed.

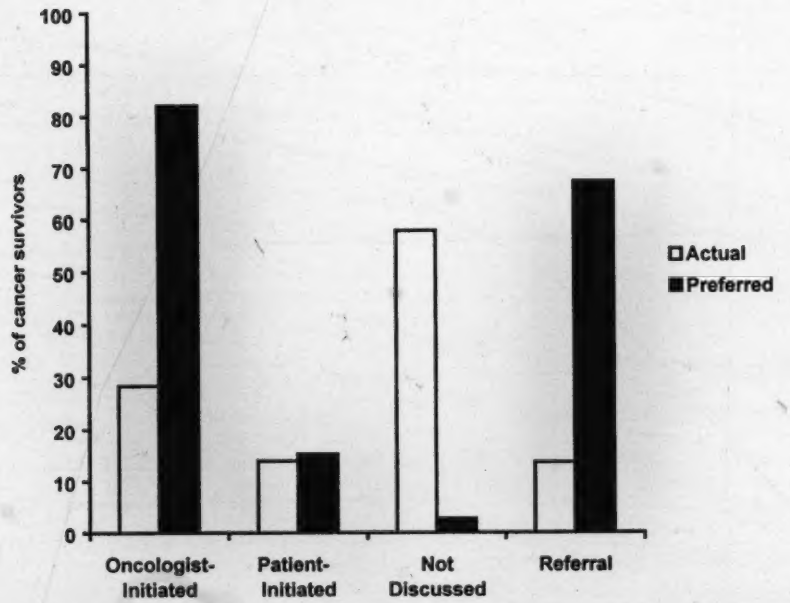
Table 1-2

Descriptive Statistics for Actual Discussion of Psychosocial and Behavioral Issues During Treatment Consultations

Issue	Oncologist Initiated Discussion	Survivor Initiated Discussion	Not Discussed	If Discussed, Survivor Was Referred
Exercise (n = 296)	28.4%	13.9%	57.8%	13.6%
Psychological Issues (n = 294)	35.4%	11.2%	53.4%	22.3%
Social Issues (n = 291)	31.6%	7.2%	61.2%	16.2%
Smoking Status (n = 294)	37.4%	5.1%	57.5%	4.9%
Nutrition (n = 292)	25.0%	15.8%	59.2%	21.6%
Weight Control (n = 292)	18.2%	8.9%	72.6%	13.8%
Alcohol Intake (n = 292)	21.6%	9.2%	69.2%	9.5%
Spiritual Issues (n = 291)	5.8%	4.5%	89.7%	19.2%
Sexuality Issues (n = 295)	26.8%	6.8%	66.4%	15.7%

Figure 1-1

Percent of Cancer Survivors Reporting Actual and Preferred Exercise Discussions/ Referrals During Treatment Consultations



Relationship Between Exercise Discussion on Normative Beliefs and Exercise Behavior

Participants were asked whether exercise was discussed during their treatment consultation with their oncologist(s). This consultation always occurs prior to the initiation of any treatment. In the same survey, participants were also asked about their exercise behavior during cancer treatment and their current normative beliefs. Therefore, discussion of exercise with the oncologist(s) would have had to occur prior to the measurement of exercise behavior/normative

beliefs. This time frame for the different questions allowed the appropriate time delay between exercise discussion and exercise behavior/normative beliefs. Descriptive statistics of participant's normative beliefs and self-reported exercise behavior are provided in Table 1-3. Concerning the American College of Sports Medicine (1998) guidelines, we found that only 15.8% (47/298) of participants met the criterion of accumulating at least 150 minutes of moderate/strenuous exercise per week. A multivariate analysis of variance (MANOVA) was conducted to examine the effects of exercise discussion (i.e., oncologist-initiated, survivor-initiated, not discussed) on normative beliefs and exercise behavior (i.e., mild, moderate, and strenuous frequencies and minutes). The overall MANOVA was significant [Wilks' λ =.69; $F(14,538)=7.94$, $p<.001$] and was deconstructed with univariate analyses of variance (ANOVAs). As hypothesized, there were significant effects for exercise discussion on normative beliefs, mild frequency, mild minutes, moderate frequency, and strenuous frequency (Table 1-3). Moreover, in separate ANOVAs we also found significant effects of exercise discussion on total frequency, total minutes, and LSI. We followed significant ANOVAs with LSD post hoc tests and generally found that oncologist-initiated discussions were superior to no discussion (see Table 1-3).

Table 1-3

Descriptive Statistics for Patients' Normative Beliefs and Exercise Behavior Across Actual Discussion During Treatment Consultations

		Overall	Discussion Initiated by Oncologist	Discussion Initiated by Patient	Not Discussed	F	Post Hoc
Normative Belief	M	4.08	5.10	4.77	3.40	40.65***	OI,PI>ND
	SD	1.64	1.42	1.70	1.39		
Mild Frequency	M	2.99	3.80	2.56	2.71	4.59*	OI>PI, ND
	SD	3.14	3.55	2.55	3.00		
Mild Minutes	M	100.31	136.20	90.20	85.90	3.86*	OI>ND
	SD	146.61	169.60	124.81	137.52		
Moderate Frequency	M	1.27	1.93	1.39	.95	5.37**	OI>ND
	SD	2.27	2.89	2.15	1.88		
Moderate Minutes	M	55.41	71.50	41.40	51.22	1.32	
	SD	141.99	147.30	69.20	152.11		
Strenuous Frequency	M	.36	.48	.68	.22	2.57†	
	SD	1.24	1.57	1.43	.96		
Strenuous Minutes	M	19.77	18.58	41.70	15.10	1.62	
	SD	82.72	87.79	107.68	72.50		
Total Frequency	M	4.63	6.22	4.63	3.90	10.19***	OI>PI,ND
	SD	3.96	5.10	2.93	3.31		
Total Minutes	M	175.56	226.46	173.29	152.16	2.69†	
	SD	237.37	259.19	143.90	242.08		
Leisure Score Index	M	18.63	25.43	20.78	14.87	9.48***	OI>ND
	SD	18.79	25.19	14.74	14.79		

Note. ***p<.001; **p<.01; *p<.05; †p<.07. OI = oncologist initiated, PI = patient initiated, ND = not discussed.

Determinants of Actual Discussion of Exercise During Treatment Consultations

Chi-square analyses were performed on select demographic and medical variables to limit the number of analyses performed to guard against Type I errors. Results uncovered only one statistically significant finding. Specifically, survivors who were younger (≤ 60 years of age) were more likely to initiate a discussion of exercise than survivors who were older (see Figure 1-2).

Preferred Discussion of Exercise During Cancer Consultations

Details of the preferred discussion of psychosocial and behavioral issues during treatment consultations are provided in Table 1-4. For physical exercise, 82.2% of survivors felt the oncologist should initiate a discussion, 15.2% felt only the survivor should initiate a discussion, and 2.7% felt exercise should not be discussed (see Figure 1-1). Of the 97.4% of cancer survivors who believed that exercise should be discussed during treatment consultations, 67.2% felt the survivor should be referred to a specialist. Compared to the other psychosocial and behavioral issues listed, physical exercise ranked 2nd in terms of a preference for oncologist-initiated discussion, 6th in terms of believing it should only be initiated by the survivor, and tied for last in believing that it should not be discussed at all. Finally, physical exercise ranked 3rd in the preference for a referral to a specialist when it is discussed.

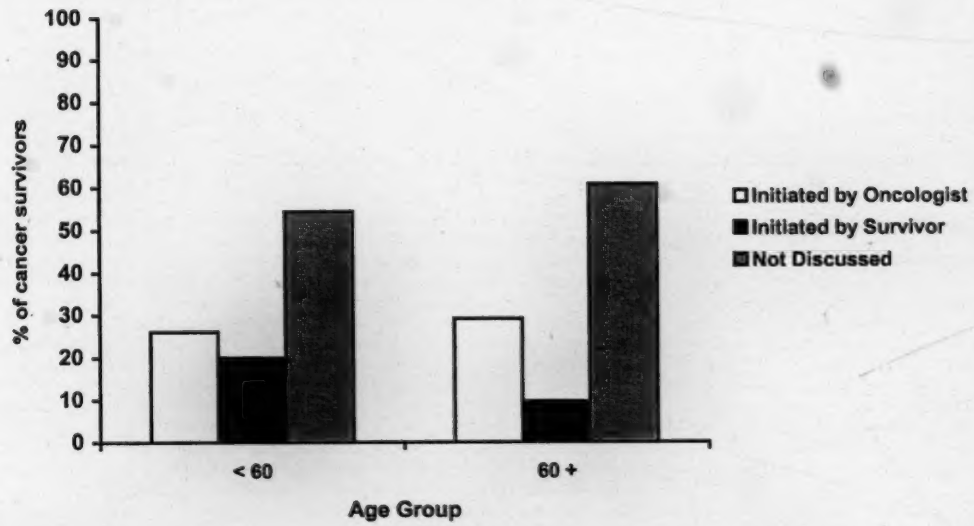
Table 1-4

Descriptive Statistics for Preferred Discussion of Psychosocial and Behavioral Issues During Treatment Consultations

Issue	Oncologist Should Initiate Discussion	Only Patient Should Initiate Discussion	Should Not Be Discussed	If Discussed, Patient Should Be Referred
Exercise (n = 264)	82.2%	15.2%	2.7%	67.2%
Psychological Issues (n = 262)	80.5%	14.9%	4.6%	67.9%
Social Issues (n = 243)	60.5%	33.7%	5.8%	60.2%
Smoking Status (n = 238)	78.6%	11.3%	10.1%	42.4%
Nutrition (n = 262)	84.7%	12.6%	2.7%	71.6%
Weight Control (n = 256)	77.7%	18.0%	4.3%	63.3%
Alcohol Intake (n = 243)	74.5%	16.9%	8.6%	46.2%
Spiritual Issues (n = 245)	36.3%	40.0%	23.7%	47.6%
Sexuality Issues (n = 256)	59.4%	31.6%	9.0%	54.5%

Figure 1-2

Percent of Cancer Survivors Reporting an Exercise Discussion during Treatment Consultations by Age (<60 vs. >60)



Determinants of Preferred Discussion of Exercise During Treatment Consultations

Descriptive statistics of possible demographic and medical determinants of preferred exercise discussion during treatment consultations are provided in Table 1-5. Chi-square analyses indicated significant effects for education, income, and cancer site. Specifically, cancer survivors who completed university and had higher incomes were more likely to prefer that the oncologist initiate a discussion of exercise compared to survivors who completed high school and had lower incomes. The reverse was true for preferred survivor-initiated discussions of

exercise. Finally, lung cancer survivors were more likely to prefer that the survivor initiate a discussion of exercise compared to breast, prostate, and colorectal cancer survivors (Figure 1-3). There were no significant findings for the other demographic and medical determinants.

Figure 1-3

Percent of Cancer Survivors Preferring an Exercise Discussion during Treatment Consultations by Cancer Site

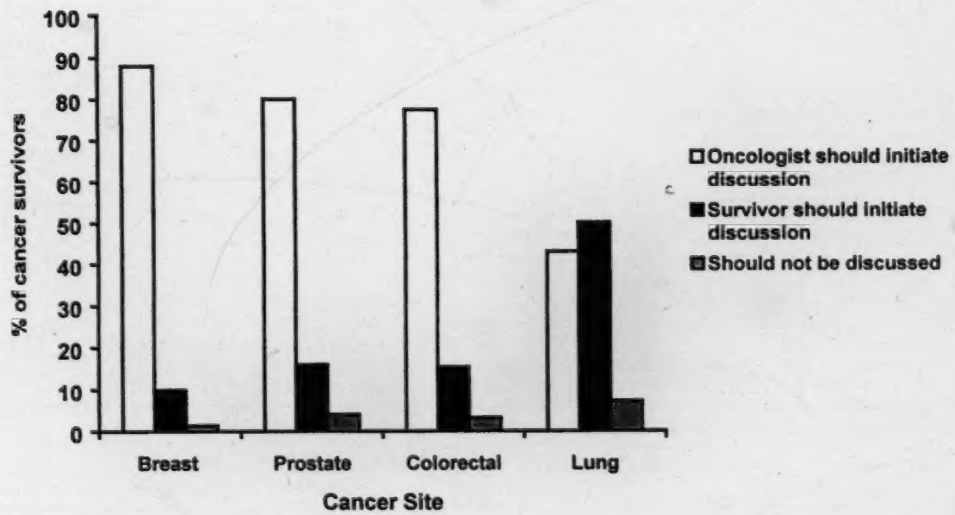


Table 1-5

Determinants of Preferred Discussion of Exercise During Treatment Consultations

	Oncologist Should Initiate Discussion	Only Patient Should Initiate Discussion	Should Not Be Discussed	χ^2	P-level
Sex					
Male	78.6%	17.5%	3.9%	1.99	.369
Female	84.9%	13.2%	1.9%		
Age					
<60	86.8%	11.6%	1.7%	3.39	.183
>60	78.2%	18.3%	3.5%		
Education					
Completed High School	78.2%	20.2%	1.7%	7.10	.029
Completed University	88.3%	8.8%	2.9%		
Income					
<$40,000	72.7%	22.7%	4.5%	7.33	.026
>$40,000	87.1%	10.8%	2.2%		
Type					
Breast	88.7%	9.9%	1.4%	20.40	.002
Prostate	80.0%	16.0%	4.0%		
Colorectal	77.4%	15.4%	3.2%		
Lung	42.9%	50.0%	7.1%		
Stage					
I/II	84.2%	13.3%	2.5%	2.42	.297
III/IV	74.2%	21.6%	3.9%		
Surgery					
Yes	83.5%	14.0%	2.5%	1.68	.793
No	76.7%	20.0%	3.3%		
Chemotherapy					
Yes	83.2%	15.0%	1.9%	.176	.916
No	82.7%	14.7%	2.7%		
Radiation					
Yes	85.5%	12.1%	2.3%	4.12	.127
No	75.3%	21.2%	3.5%		

Discussion

The present study used a retrospective design to examine and confirm the potential role of the oncologist in promoting exercise in cancer survivors during adjuvant therapy. Several findings were revealed. First, the majority of cancer survivors reported that exercise was not discussed during their treatment consultation. Second, the majority of cancer survivors preferred their oncologist to initiate a discussion on exercise during treatment consultations. Third, cancer survivors who reported that exercise was discussed during their treatment consultation reported higher normative belief and exercise outcomes than survivors who reported that exercise was not discussed.

A major preliminary finding of the present study was the low rate at which exercise was discussed during treatment consultations. The rate of 42.3% reported in the present study is quite comparable to other recent studies that asked about physicians/health care providers. (Segar et al.,1998; Young-McCaughan & Sexton, 1991; Demark-Wahnnefried et al., 2000; Scwartz, 1998). For example, Young-McCaughan and Sexton (1991) found that only 41% of breast cancer survivors said that their physician mentioned exercise to them as part of their rehabilitation. Similarly, Segar et al. (1998) reported that 50% of breast cancer survivors received a physician's recommendation to exercise. In a more recent study, Demark-Wahnefried and colleagues (2000) found that only 34% of breast and 36% of

prostate cancer survivors reported receiving a recommendation to exercise from their physician.

In addition, results indicated that only about 28% of survivors reported that their oncologist initiated a discussion of exercise with them during their treatment consultations. These findings corroborate previous reports in healthy populations and suggest that rates of exercise counseling in sedentary, but otherwise healthy individuals (e.g., Wee, McCarthy, Davis, & Phillips, 1999) are similar to cancer survivors receiving adjuvant therapy. None of these studies, however, asked about who initiated the discussion of exercise. Our data indicate that up to one-third (13.9% of 42.3%) of those discussions were likely initiated by the cancer survivors themselves.

Moreover, of the 42.3% of cancer survivors who reported discussing exercise with their oncologist, only 13.6% were referred to a specialist for further exercise counseling. Presumably, most oncologists do not have the training or resources to develop individualized exercise prescriptions for cancer survivors, consequently, the low number of referrals may have resulted from a lack of referral opportunities. The location of the few referrals is unknown but it is likely that most were sent to on-site physiotherapy services for specific impairments to be addressed.

The key finding of the present study is that cancer survivors who reported an oncologist-initiated discussion of exercise during their treatment consultation

also reported more exercise during their subsequent treatments. More specifically, these survivors reported more frequent mild, moderate, strenuous, and total exercise as well as more minutes of mild and total exercise. This finding is consistent with a previous study that reported the effects of a physician recommendation on exercise levels in breast cancer survivors (Segar et al., 1998). Interestingly, our data show that survivor-initiated discussions are not as effective in motivating exercise behavior as oncologist-initiated discussions. It is not clear whether this lack of effectiveness for survivor-initiated exercise discussions is due to some fundamental psychological difference between the two conditions (i.e., proactive versus reactive discussions) or whether survivors who initiated a discussion simply received more of a lukewarm response to exercise from the oncologist. Future research is needed to delineate this issue.

One important preliminary finding of the present study was that, during their cancer treatments, only 15.7% of cancer survivors met the American College of Sports Medicine's (1998) guideline of accumulating at least 30 minutes of moderate/strenuous exercise per day for at least five days per week. This percentage of "active" cancer survivors is even lower than that reported in previous studies (Courneya & Freidenreich, 1997a; Courneya & Freidenreich, 1999; Wyatt, Friedman, Given, Christensen-Beckrow, 1999) most likely because those studies used less stringent definitions for being defined as active. In any case, the low participation rate underscores the need to develop effective interventions to

promote exercise in cancer survivors.

Another important finding of the present study is that cancer survivors who reported an oncologist-initiated discussion of exercise during their treatment consultation also reported a higher normative belief. This finding is consistent with previous research which has shown a significant positive relationship between perceived physician approval/support for exercise and cancer survivors' self-reported exercise behavior (Courneya et al., 1999) and objective exercise behavior as measured by attendance at a structured exercise class (Courneya et al., 2001). It is an important finding because it identifies a potential theoretical explanation for the effectiveness of oncologist-initiated discussions of exercise on subsequent exercise behavior. That is, the TPB (Ajzen, 1991) hypothesizes that people are more likely to perform a behavior when they believe that important others in their lives think they should perform it. For cancer survivors, there is probably no more trusted person than their oncologist when it comes to making decisions about which behaviors to perform or not perform during treatments. Future research should develop other interventions based on the TPB because it is currently the only validated theoretical model for understanding exercise behavior in cancer survivors (Courneya et al., 2001; Courneya et al.,1999; Courneya & Freidenreich, 1997a; Courneya & Freidenreich, 1999).

One progressive finding of the present study is that oncologists did not appear to be influenced by any medical or demographic factors when initiating a

discussion of exercise with their survivors. That is, they were not influenced by the survivors' age, sex, education, income, type of cancer, stage of cancer, or type of treatment. We did find, however, that younger cancer survivors' were about twice as likely to initiate a discussion of exercise than older cancer survivors. Consequently, oncologists may need to be more diligent with older cancer survivors to reassure them that exercise is a safe and beneficial modality during their cancer treatments. Future research may wish to examine other medical and demographic variables not examined in the present study.

Lastly, results indicated overwhelming support for the proposition that cancer survivors prefer that oncologists initiate a discussion of exercise during their treatment consultations. More specifically, 82.2% of our participants felt that the oncologist should initiate a discussion of exercise whereas only 2.7% felt exercise should not be discussed. Moreover, of those survivors who indicated that exercise should be discussed during their treatment consultation, 67% felt they should be referred to a specialist for further consultation. Interestingly, this level of preference for exercise discussion and referral compared very favorably to other more established psychosocial and behavioral activities that are considered integral aspects of cancer care and are readily available to cancer survivors who seek them (e.g., psychosocial counseling, pastoral counseling, nutritional counseling). These results suggest that cancer survivors consider physical exercise at least as important as other psychosocial and behavioral services, yet

most cancer centers do not provide fitness counseling as part of their standard of care.

Limitations

Although the present study provides important information on the role of the oncologist in promoting exercise to cancer survivors, there are limitations that need to be taken into consideration when interpreting the results and planning future research. First, despite attempts to disguise the purpose of the study by including additional psychosocial and behavioral activities, there are still likely selection biases because most questions were on exercise. Consequently, cancer survivors who were more interested in exercise were probably more likely to participate in the study. Second, the use of self-reported exercise behavior, which is usually not as valid as an objective exercise measure. Future studies should attempt to obtain objective measures of exercise such as pedometers or attendance at a fitness center. The most significant limitation of this study, however, is the retrospective design and the absence of randomization to conditions. Such a design is susceptible to memory biases and it also leaves open alternative explanations for why cancer survivors who reported an oncologist-initiated discussion of exercise also reported more subsequent exercise. As always, a prospective, randomized controlled trial is needed to provide a definitive answer to this question.

Conclusion

Results of the present study found that only about 28% of survivors reported that their oncologist initiated a discussion of exercise with them during their treatment consultations. Moreover, those who did report such a discussion also reported significantly higher normative beliefs and greater exercise levels during their subsequent cancer treatments. Also cancer survivors have an almost uniform preference for receiving an oncologist-initiated discussion of exercise during their treatment consultations. These preliminary findings suggest that an oncologist recommendation for exercise maybe an effective and feasible strategy for promoting exercise in cancer survivors. However, the promising results of our study confirm that a prospective, randomized controlled trial of oncologist-initiated exercise discussions is warranted.

Chapter Three

Study Two

Examining the Effects of an Oncologist's Recommendation on Exercise Motivation in Newly Diagnosed Breast Cancer Survivors

Introduction

Recent theorizing has suggested using theory-based information in the development and implementation of behavior change interventions (Ajzen, 2002a; Fishbein, 2001, Fishbein, von Haeften, & Appleyard, 2001). Specifically, data from theoretical questionnaires can identify individuals' salient beliefs that can be targeted in a subsequent intervention. The results of study one corroborated previous TPB research that identified a perceived physician approval/support for exercise (a normative belief) to be significantly correlated with intention and exercise behavior (Courneya & Friedenreich, 1997a.b; Courneya et al., 1999) in cancer survivors. The results also supported previous reports suggesting that cancer survivors are motivated to initiate lifestyle and behavioral changes in the period following diagnosis and initial treatments (Demark-Wahnefried et al., 2000; Jones & Courneya, in press; Lee, Lin, & Wrensch, 2000; Maunsell et al., 2002).

Moreover, previous physician-based counseling trials have identified several important barriers (e.g., time, lack of knowledge, lack of support staff) that may prevent physicians providing exercise counseling (Bull et al., 1995; Long et al., 1996; Pinto et al., 1998; Swinburn et al., 1997) (see Appendix B). Consequently, several sophisticated research designs have been developed to overcome the aforementioned barriers, however lack of time and other associated barriers are still consistently identified as the predominant factors hindering exercise counseling in medical settings (Long et al., 1996; Swinburn et al., 1998).

Furthermore, the primary cancer consultation is often a stressful period for patient and oncologist, the main purpose of which is the selection and initiation of treatment (Hack et al., 1998) and oncologists are even less likely than family or general practitioners to receive training on behavioral counseling. Therefore, the oncologist-based exercise intervention trial was designed to overcome these barriers by developing simple and structured intervention materials feasible for the cancer treatment consultation.

Purpose of Present Study

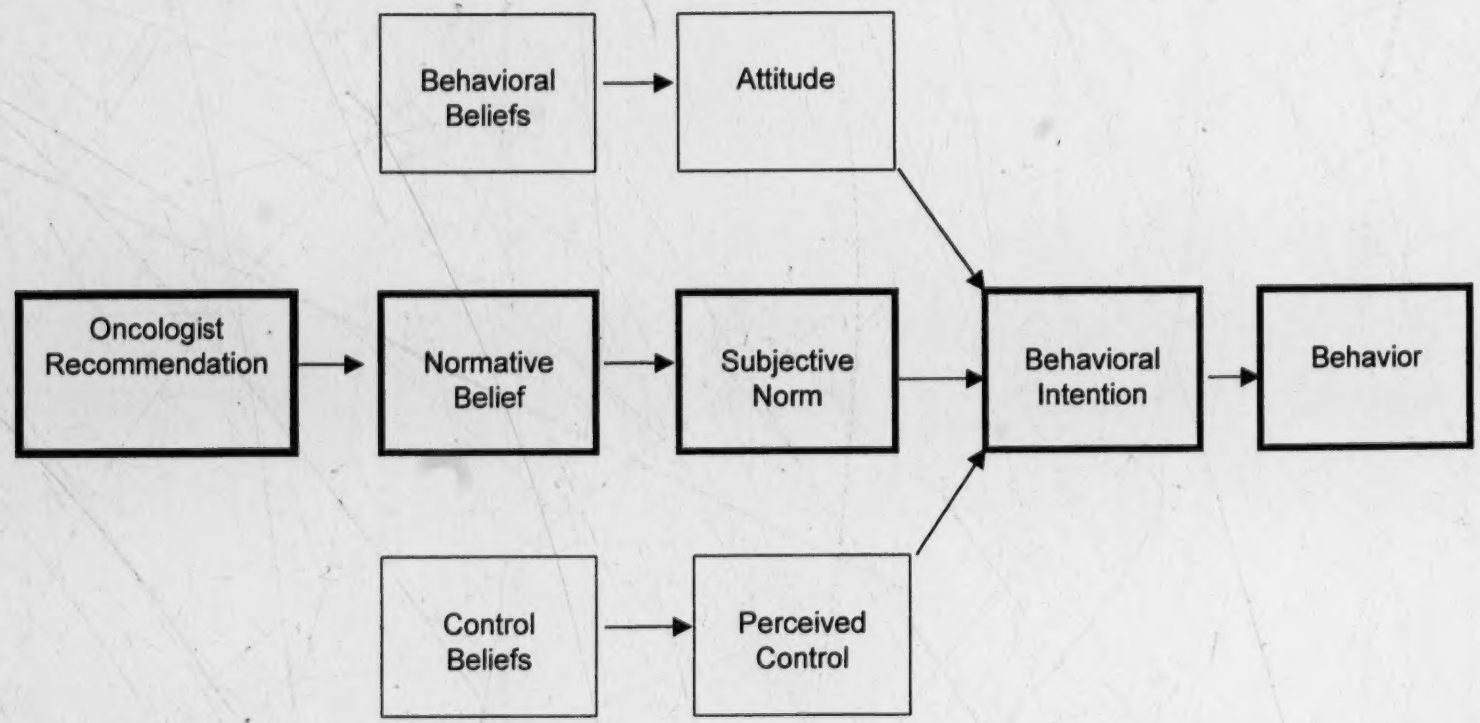
Based on this rationale, the purpose of this study was to examine the effects of an oncologist's recommendation to exercise in newly diagnosed breast cancer survivors in a randomized controlled trial. Specifically, the effects of two interventions were compared to the conventional standard of treatment and with each other on self-reported exercise behavior and TPB outcomes. In addition, recognizing that a very brief oncologist-based recommendation may not have sustainable effects on exercise levels and recent research indicating that a majority of cancer survivors are interested in receiving exercise counseling from an exercise professional (Jones & Courneya, in press), the feasibility of a fitness/lifestyle referral was also explored in this study. Uniquely, this is the first study to attempt to improve exercise levels in cancer survivors and to do so using a theoretically driven intervention in a randomized controlled design.

The primary hypothesis was that the recommendation plus referral group

would report significantly higher behavioral outcomes than the recommendation only group and both would be superior to the conventional treatment group at two weeks. A second hypothesis was that the recommendation plus referral group would report significantly higher oncologist belief, normative belief, subjective norm, and behavioral intention than the recommendation only group and both would be superior to the conventional treatment group, with no significant effects on attitude and perceived control at two weeks (see Figure 2-1). A third hypothesis was that the recommendation plus referral would report significantly higher behavioral outcomes than the recommendation only group and both would be superior to the conventional treatment group at five weeks. A fourth hypothesis was that the effects of an oncologist-based exercise recommendation on exercise behavior outcomes at five weeks would be mediated by intention and perceived control. In addition, intention would be mediated by subjective norm, which in turn would be mediated by oncologist belief. An exploratory purpose was to examine the effects of an exercise referral on behavioral outcomes at five weeks.

Figure 2-1

Schematic Representation of Proposed Route of the Intervention in the Theory of Planned Behavior (Note: Bold indicates hypothesized path of the intervention)



Method

Setting

The study was conducted at the Cross Cancer Institute and the Behavioral Medicine Fitness Center at the University of Alberta, Edmonton, Canada. The Alberta Cancer Board Research Ethics Board and the University of Alberta Health Research Ethics Board approved the study. Participants provided written informed consent for all study procedures

Oncologist Participants

Oncologist participants were 6 medical oncologists and 4 radiation oncologists. All oncologists were members of the Northern Alberta Breast Cancer Program, Cross Cancer Institute, Edmonton, AB, Canada.

Survivor Participants

Patient participants were female breast cancer survivors who met the following criteria: 1) were scheduled to attend a primary treatment consultation for adjuvant therapy during the recruitment phase, 2) non-metastatic, 3) able to read and write English, 4) willing to complete and return the study questionnaire. Participants were excluded from the study if they: 1) had known cardiac or pulmonary disease, 2) had uncontrolled hypertension, 3) had significant physical or mental disabilities, and 4) were pregnant. Recruitment took place twice weekly over a six month period (July 2001-December 2001).

Experimental Design and Procedures

The study was a three-armed, prospective, randomized controlled trial. Potential participants were identified via medical record reviews before each breast tumor clinic. On arrival to the breast tumor clinic, a research assistant approached potential participants and asked if they would be interested in participating in a research study. Written consent was obtained from all recruited participants prior to their treatment consultation. Consenting participants were then randomized to one of three groups: exercise recommendation only, exercise recommendation plus referral, or the conventional treatment consultation with no exercise recommendation or referral. Following randomization, a group assignment sheet was attached to the participant's medical chart indicating that the participant had been recruited to the study. The group assignment sheet also provided oncologists with a standardized physical exercise recommendation (based on group assignment) and acted as a visual reminder for oncologists to deliver the appropriate intervention. Following the treatment consultation, oncologists reported if the group assignment had been correctly delivered (yes/no) and provided an explanation if the intervention was not delivered (e.g., the oncologist considered the participant inappropriate for an exercise intervention).

One week following the initial treatment consultation, all participants were mailed a questionnaire package containing a detailed cover letter, two copies of the informed consent form, a questionnaire, and a stamped, self-addressed return

envelope. Survey methods known to increase response rates were used including a postcard reminder, stamped return envelopes, personalized cover letters, colored paper, assurances of confidentially, and university sponsorship (Dillman, 1983). Participants returning completed questionnaires also received a very brief follow-up phone-call from a trained research assistant who was blinded to group assignment approximately five weeks following the initial treatment consultation.

Study Concealment

Previous physician-based exercise counseling research trials have recruited participants to an 'exercise study', therefore intervention and more importantly control participants were aware of the study's purpose and objectives. Such information may influence participants exercise beliefs and behavior, which may reduce the reliability and validity of the results (demand characteristics). Therefore, in the present study potential participants were asked to participate in a study investigating 'patient-oncologist communication'. This approach enhanced the internal validity of our methodology on a number of fronts. First, it is possible that only breast cancer survivors who were interested in exercise might have been recruited to the study, which may have limited the generalizability of the results. Second, participants who were randomly assigned to the conventional treatment group are also aware of the study's aims and objectives, which may influence their exercise beliefs and behavior. Finally, the concealed study purpose enabled an independent evaluation of the effects of an oncologist recommendation alone on

breast cancer survivors exercise beliefs and behavior.

Training of Oncologists

All oncologists and clinical trial nurses attended three meetings with the principal investigator. The goals of these meetings were to: (a) provide an overview of the study protocol, (b) increase oncologists and nurse's knowledge regarding the benefits of exercise for breast cancer survivors during adjuvant therapy, (c) provide specific details regarding the one minute recommendation for exercise and referral and, (d) to obtain feedback on study design and procedures.

Randomization

Participants were randomly assigned to experimental groups using a computer generated random numbers list (StatMate, Version 1.01, 1998). A permuted block design was used to generate the allocation sequence to ensure a close balance in each group. The block sizes for each group were 100 in a specified allocation sequence ratio of 1:1. Group assignments were enclosed in sealed envelopes. The project director generated the allocation sequence and prepared the group assignment envelopes. The envelopes were concealed from the research assistant who enrolled participants into the study and the oncologists who delivered the intervention. The research assistant opened the envelopes sequentially after participants were recruited to the study.

Intervention

The study intervention was developed within the context of the Theory of

Planned Behavior (TPB) (Ajzen, 1991; Ajzen, 2002b). The TPB describes key informational and motivational constructs (i.e., attitude, subjective norm) postulated to be important determinants of behavioral intention and behavior. Based on formative results of study one, the present investigation focused on the impact of an oncologist's recommendation on exercise motivation. In TPB context, this would be considered a subjective norm/normative belief motivational influence (see Figure 2-1). Both intervention groups were given the same physical exercise recommendation: accumulation of 20-30 minutes of moderate intensity exercise on most, if not all days of the week. This recommendation reflects current national physical exercise recommendations (ACSM, 1998) and prescription guidelines for breast cancer patients receiving adjuvant therapy (Courneya, 2001).

Recommendation Only Group. Participants in the recommendation only group received a brief oncologist recommendation (1 minute) to exercise based on the aforementioned exercise guidelines. The actual recommendation was "recent research has shown that some of the side effects you may experience during treatment may be controlled with a modest exercise program. I recommend trying to exercise 20-30 minutes everyday at a moderate intensity. Even less than this may be beneficial, but try to do something everyday. Exercises such as a brisk walking program will meet these requirements" (see Appendix E).

Recommendation plus Referral Group. Participants in the recommendation plus referral group received the same oncologist recommendation to exercise as

those participants in the recommendation only group. In addition, participants were given contact information (i.e., business card) where they could receive a free fitness/lifestyle consultation. The actual recommendation was, "recent research has shown that some of the side effects you may experience during treatment may be controlled with a modest exercise program. I recommend trying to exercise 20-30 minutes everyday at a moderate intensity. Even less than this may be beneficial, but try to do something everyday. Exercises such as a brisk walking program will meet these requirements. In fact, here is a business card where you can obtain a free fitness consultation and obtain further information regarding the benefits of exercise for cancer survivors" (see Appendices F and G).

The consultations were performed by a masters prepared exercise physiologist and were conducted at the Behavioral Medicine Fitness Centre at the University of Alberta. Physical fitness assessments consisted of: (a) physical measurements (height, weight, body fat percentage, flexibility), (b) assessment of current physical exercise levels (Godin Leisure Time Exercise Questionnaire, GLTEQ), (c) a sub-maximal exercise treadmill test (Modified Balke Protocol - the test was terminated when participants reached 70% of their age-predicted maximum or they developed severe dyspnea, dizziness, chest pain, or an abnormal blood pressure or heart rate response), and (d) the prescription of an individualized exercise program, designed to improve cardiovascular fitness.

Conventional Treatment Group. Participants in the conventional treatment

group received the standard treatment consultation with no exercise recommendation or referral.

Outcomes

The primary outcome was self-reported exercise behavior at two and five weeks. Secondary outcomes were TPB variables at two weeks post-treatment consultation. The relatively short two week time period was chosen to reflect optimal predictive accuracy, given the dynamic nature of social cognitions (Ajzen, 2002b). A third outcome was the percentage of participants who attended a fitness consultation.

Assessments

Self-Reported Exercise Behavior was assessed by the leisure score index (LSI) of the Godin Leisure-Time Exercise Questionnaire (GLTEQ) (Godin et al., 1986; Godin & Shepherd, 1985), an instrument often used to assess self-reported exercise behavior in cancer survivors (Courneya & Friedenreich, 1997a; Courneya et al., 1999). The LSI contains questions that assess the average frequency of moderate intensity exercise during free time in a typical week. The LSI was modified so that average duration was also provided. An independent evaluation of this measure found its reliability and validity to compare favorably to nine other self-report measures of exercise based on various criteria including test-retest scores, objective activity monitors, and fitness indices (Jacobs et al.,1993). The LSI demonstrated a one month rest-retest reliability of .62 and concurrent validity

coefficients of .32 with an objective activity indicator (CALTRAC accelerometer), .56 with VO2 max (as measured by expired gases), and -.43 with percent body fat (as measured by hydrostatic weighing). In the present study, participants completed the LSI at two and five week's post-treatment consultation. Separate scores were computed for frequency and minutes of moderate exercise. Scores were also computed for total frequency and total minutes of exercise (see Appendix H).

Demographic and Medical Information was collected using self-report measures and included age, marital status, education, income, and employment status. The medical variables were abstracted from medical records and consisted of date of diagnosis, stage of disease, and types of adjuvant cancer treatment (i.e., surgery, radiation, chemotherapy).

Discussion of Exercise During Treatment Consultations was assessed using an investigator developed measure. Participants were asked what psychosocial and behavioral issues were discussed during their treatment consultation. Eight additional psychosocial and behavioral issues were included (besides exercise) to further conceal the purpose of the study. The nine psychological and behavioral issues were: (a) psychological (e.g., anxiety), (b) social issues (e.g., family concerns), (c) smoking status, (d) nutritional advice, (e) weight control, (f) exercise, (g) alcohol intake, (h) spiritual issues, and (I) sexuality issues. The statement that preceded all issues was "Which of the following issues

were discussed during your consultation with your oncologist"? Three options were provided for each issue: (1) discussion initiated by the oncologist, (2) discussion initiated by you, and (3) not discussed. If participants reported that the issue was discussed (either oncologist – or survivor-initiated), they were then asked if they were referred to a specialist (yes/no).

Oncologist Belief from the TPB (Ajzen, 1991) was assessed by one item taken from previous research in breast cancer survivors (Courneya et al., 2001; Courneya & Freidenreich, 1999) and was rated on a 7 point scale that ranged from 1 (strongly disapprove) to 7 (strongly approve). The statement that preceded the item was: "How strongly would your oncologist approve or disapprove of you trying each of the following psychosocial and behavioral activities over the next month".

Motivation to Comply from the TPB (Ajzen, 1991) was assessed by one item commonly used in research applying the TPB to exercise in cancer survivors (Courneya & Freidenreich, 1997a) and was rated on a 7 point scale that ranged from 1 (strongly disagree) to 7 (strongly agree). The statement that preceded the item was: "Over the next month, if my oncologist advised me, I would". Normative belief was also calculated (oncologist belief x motivation to comply) as suggested by Ajzen (1991).

Subjective Norm from the TPB (Ajzen, 1991) was assessed by one item and was rated on a 7 point scale that ranged from 1 (strongly disagree) to 7 (strongly agree). The statement that preceded the item was: "Most people who are

important to me think I should". An evaluation of this item in previous reports has demonstrated acceptable validity and reliability (Courneya et al., 2001; Courneya & Freidenreich, 1999).

Attitude from the TPB (Ajzen, 1991) was measured by two items rated on 7-point scales that tapped instrumental aspects (useful-useless, important-unimportant) of attitude. The verbal descriptors were extremely (points 1 and 7), quite (points 2 and 6), and slightly (points 3 and 5). The statement that preceded the adjectives was "For me, exercising regularly would be". An evaluation of these items in previous related studies of breast cancer survivors demonstrated acceptable validity and reliability (Courneya et al., 2001; Courneya & Freidenreich, 1999).

Perceived Behavioral Control from the TPB (Ajzen, 1991) was assessed by one item taken from previous research in breast cancer survivors (Courneya et al., 2001; Courneya & Freidenreich, 1999) and was rated on a 7 point scale that ranged from 1 (extremely east) to 7 (extremely difficult). The statement that preceded the item was: "How easy or difficult would it be for you to".

Exercise Intention from the TPB (Ajzen, 1991) was assessed by one item taken from research applying the TPB to exercise in breast cancer survivors (Courneya et al., 2001; Courneya & Freidenreich, 1999) and was rated on a 7 point scale that ranged from 1 (strongly disagree) to 7 (strongly agree). The statement that preceded the item was: "I intend to perform the following

psychosocial and behavioral activities over the next month".

Sample Size Calculation and Statistical Analyses

For the primary outcome, we needed 76 participants in each group to detect a medium effect (Eta = .14) with a power of .80 and a two-tailed alpha <.05 significance level. Our pre-specified analyses were conducted on an intention-to-treat basis using the SPSS10.0 statistical package. The primary analysis used an analysis of variance (ANOVA) (using a modified bonferroni correction level) with Group as the between subjects factor (exercise recommendation only, exercise recommendation plus referral, conventional standard of treatment) on exercise behavior at two and five weeks and TPB outcomes at two weeks only. Significant univariate effects were further deconstructed using Tukey post hoc comparisons. All participants with a self-reported exercise and TPB measure at two weeks and an exercise measure at five weeks were included in the analyses. If data were missing, data from the assigned group mean was used in the analyses.

The possible mediation effect of exercise behavior by TPB variables was tested using a path analysis (Pedhazur, 1982). In the present study, a theory trimming approach was taken whereby all possible paths are tested and nonsignificant ones are deleted (Pedhazur, 1982). Significant behavioral constructs were regressed on all salient variables (five TPB variables and experimental condition) using six multiple regression analyses. Constructs that emerged with significant standardized betas are shown by a direct path to

behavioral outcomes. Intention was then regressed on all remaining salient variables. Constructs that emerged with significant standardized betas are shown by a direct path to intention. This process continued for all the remaining variables and all significant standardized betas are depicted as direct paths to the construct. Effect sizes are also reported for all our analyses. In the present study, TPB and behavioral outcomes were measured at the same time at two weeks, therefore only behavioral outcomes at five weeks were analyzed in the path analysis. Eta squared are reported for univariate F tests. Cohen (1988; 1992) suggests the following guidelines for interpreting effects sizes in the behavioral sciences: $\acute{\eta}$=.01 (small), .06 (medium), and .14 (large).

Finally, an ANOVA with group as the between subjects factor (conventional treatment group, recommendation only group, recommendation plus referral group, recommendation plus attended a referral) examined the exploratory effects of a fitness/lifestyle consultation on exercise behavior at five weeks.

Results

Flow of Participants Through the Study

Participant flow throughout the study is described in Figure 2-2. A total of 434 potential participants attended a primary treatment consultation during the six month recruitment period. Of these, 325 (75%) met the inclusion criteria and 300 were randomized to experimental groups (69%). Of the 100 participants who were assigned to the conventional treatment group, 98 received the condition. Follow up measures were obtained on 61 and 55 at two and five weeks respectively. In the recommendation only group, 90 received the condition and follow up measures were obtained on 83 and 75 at two and five weeks respectively. Finally, in the recommendation plus referral group, 89 received the condition and follow-up information was obtained on 75 and 64 at two and five weeks respectively.

Baseline Characteristics

No significant differences were observed between the three randomized groups on medical or demographic characteristics (See Table 2-1). Participants' age ranged from 31 to 90 years (M=55.92, SD=11.84), 69% were married, and 36% had completed university/college. Medical information indicated that 53% were tumor stage I, 100% had surgery, 51% were currently undergoing or scheduled to begin chemotherapy, and 67% were currently undergoing or scheduled to begin radiation therapy.

Figure 2-2

Flow of Participants Through the Study

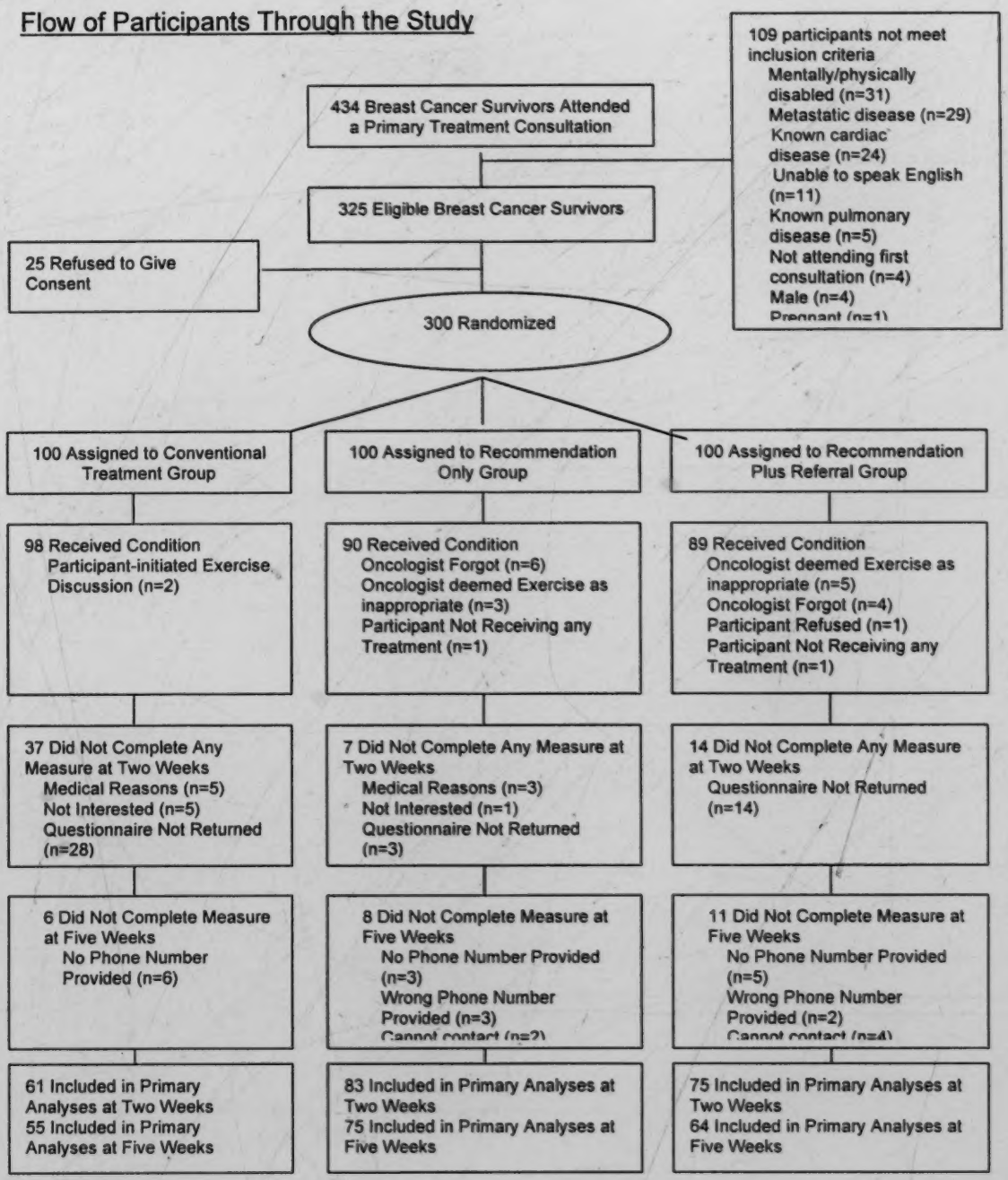

434 Breast Cancer Survivors Attended a Primary Treatment Consultation
109 participants not meet inclusion criteria
Mentally/physically disabled (n=31)
Metastatic disease (n=29)
Known cardiac disease (n=24)
Unable to speak English (n=11)
Known pulmonary disease (n=5)
Not attending first consultation (n=4)
Male (n=4)
Pregnant (n=1)
325 Eligible Breast Cancer Survivors
25 Refused to Give Consent
300 Randomized
100 Assigned to Conventional Treatment Group
100 Assigned to Recommendation Only Group
100 Assigned to Recommendation Plus Referral Group
98 Received Condition
Participant-initiated Exercise Discussion (n=2)
90 Received Condition
Oncologist Forgot (n=6)
Oncologist deemed Exercise as inappropriate (n=3)
Participant Not Receiving any Treatment (n=1)
89 Received Condition
Oncologist deemed Exercise as inappropriate (n=5)
Oncologist Forgot (n=4)
Participant Refused (n=1)
Participant Not Receiving any Treatment (n=1)
37 Did Not Complete Any Measure at Two Weeks
Medical Reasons (n=5)
Not Interested (n=5)
Questionnaire Not Returned (n=28)
7 Did Not Complete Any Measure at Two Weeks
Medical Reasons (n=3)
Not Interested (n=1)
Questionnaire Not Returned (n=3)
14 Did Not Complete Any Measure at Two Weeks
Questionnaire Not Returned (n=14)
6 Did Not Complete Measure at Five Weeks
No Phone Number Provided (n=6)
8 Did Not Complete Measure at Five Weeks
No Phone Number Provided (n=3)
Wrong Phone Number Provided (n=3)
Cannot contact (n=2)
11 Did Not Complete Measure at Five Weeks
No Phone Number Provided (n=5)
Wrong Phone Number Provided (n=2)
Cannot contact (n=4)
61 Included in Primary Analyses at Two Weeks
55 Included in Primary Analyses at Five Weeks
83 Included in Primary Analyses at Two Weeks
75 Included in Primary Analyses at Five Weeks
75 Included in Primary Analyses at Two Weeks
64 Included in Primary Analyses at Five Weeks

Table 2-1

Medical and Demographic Characteristics

Variable	Overall	Conventional Treatment Group	Recommendation Only Group	Recommendation Plus Referral Group	p-level
Demographic					
Age (years) (n=210)	55.7±11.8	56.8±12	56.0±12	54.5±12	.522
Married (n=207)	148 (68%)	42 (71%)	53 (64%)	53 (73%)	.451
Completed University (n=209)	106 (51%)	24 (41%)	43 (54%)	39 (54%)	.246
Income >$60,000/year (n=178)	67 (38%)	12 (26%)	31 (44%)	24 (39%)	.115
Full-Time employed (n=212)	68 (32%)	18 (31%)	27 (33%)	23 (32%)	.952
Medical					
Weight (kg)	71.4±14.4	71.7±14	70.7±14	72.1±15	.837
Months post-diagnosis	1.8±2.4	1.5±2	2±3	2±3	.820
Tumor stage I	74 (49%)	22 (54%)	21 (38%)	31 (58%)	.070
Surgery	213 (100%)	58 (100%)	82 (100%)	73 (100%)	1.00
Radiotherapy	140 (67%)	34 (62%)	54 (66%)	52 (72%)	.423
Chemotherapy	105 (50%)	28 (49%)	40 (49%)	37 (51%)	.739
Surgery alone vs	41 (19%)	11 (19%)	18 (22%)	12 (17%)	
Surgery plus RT vs	64 (30%)	18 (31%)	22 (27%)	24 (33%)	
Surgery plus CT vs	30 (14%)	12 (21%)	9 (11%)	9 (13%)	
Surgery plus RT and CT	77 (36%)	17 (29%)	33 (40%)	27 (38%)	.576

Data are presented as the mean ± standard deviation for continuous variables and frequency (%) for categorical variables. RT = Radiotherapy; CT = Chemotherapy

Follow-up Assessment Rates

Follow-up assessment rates for two weeks (exercise behavior outcomes and TPB outcomes) and five weeks (exercise behavior outcomes only) were 73% and 65% respectively. Specifically, 83%, 75%, and 61% of participants at two weeks and 75%, 64%, 55% of participants at five weeks responded in the recommendation only group, recommendation plus referral and conventional

standard of treatment respectively. Chi-square analyses indicated significantly different follow-up assessment rates between experimental groups at two (χ^2 (2) = 12.58, p=.002) and five weeks (χ^2 (2) = 8.00, p=.018). Follow-up chi-squares revealed that participants conventional treatment group was significantly less likely to respond than the recommendation only or the recommendation plus referral group. Eight (11%) participants contacted and attended a fitness/lifestyle consultation.

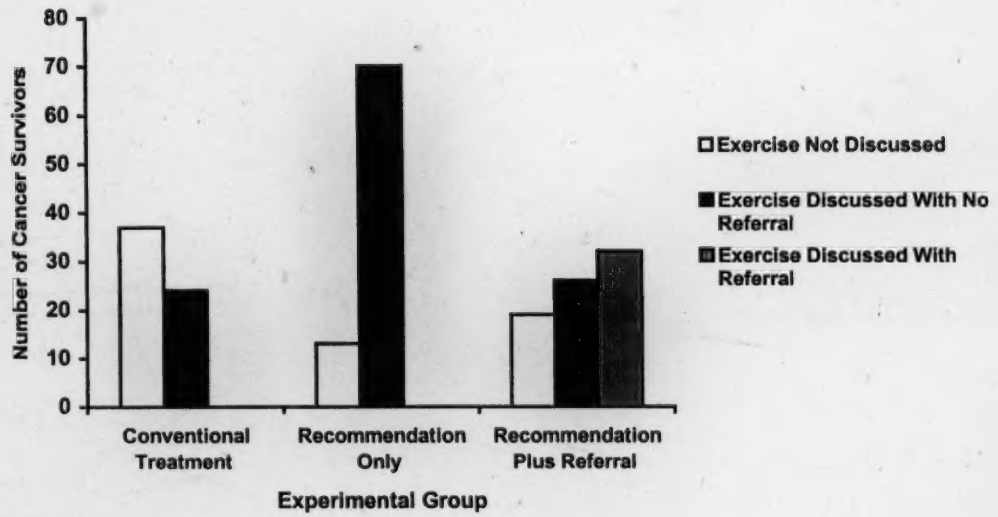
Discussion of Exercise During Treatment Consultations (Manipulation Check)

Manipulation checks indicated that of the 61 participants who were assigned to the conventional standard of treatment group and returned the two-week questionnaire, 37 (61%) reported that exercise was not discussed during the treatment consultation and 24 (35%) reported that exercise had been discussed during the consultation. Of the 83 participants who were assigned to the recommendation only group and returned the two week questionnaire, 70 (84%) participants reported that exercise had been discussed during the consultation and 13 (14%) reported that exercise was not discussed. Finally, of the 75 participants who were assigned to recommendation plus referral group, 32 (43%) participants reported that the oncologist initiated a discussion on exercise and received a referral, 26 (35%) reported that exercise had been discussed with no referral and 19 (25%) reported that exercise was not discussed (See Figure 2-3). Chi-square

analyses indicated significant differences between experimental groups on participants reporting receiving the intended intervention (χ^2 (2) = 29.74, p<.001).

Figure 2-3

Discussion of Exercise During Treatment Consultations



Ancillary Analyses

The pre-specified statistical procedure assumes that the group assignment was correctly implemented, however, the manipulation check indicated that a large minority of participants reported that they received the incorrect group assignment. Therefore, two additional analyses were performed. The first ancillary analyses used a perceived treatment procedure. That is, participants were grouped based

on their responses to the manipulation check in the two-week questionnaire. The second ancillary analyses used a 'perceived intended treatment' procedure and grouped participants who correctly perceived the intended treatment (via the two week questionnaire manipulation check).

Intention-to-Treat Analyses

Exercise Behavior and Theory of Planned Behavior Outcomes

The analysis of variance (ANOVA) for exercise behavior at two weeks revealed no significant differences for any exercise behavior outcome (see Table 2-2). The ANOVAs for TPB outcomes at two weeks revealed significant differences between groups for motivation to comply [$F(2,218)=6.20$, $p=.003$], normative belief [$F(2,218)=6.96$, $p<.001$], perceived control [$F(2,218)=6.08$, $p=.003$], and intention [$F(2,218)=13.34$, $p<.001$] (see Table 2-2). Tukey follow up post hoc comparisons revealed that in most instances the intervention groups (i.e., recommendation only, recommendation plus referral) reported significantly more positive beliefs than the conventional treatment group.

The ANOVAs for exercise behavior outcomes at five weeks revealed no significant differences for any exercise behavior outcome (see Table 2-3).

Table 2-2

One-Way Analysis of Variance for Exercise Behavior and Theory of Planned Outcomes at Two Weeks (Intention-to-Treat Analyses)

Variable	Overall (n=219)	Conventional Treatment Group (n=61)	Recommendation Only Group (n=83)	Recommendation Plus Referral Group (n=75)	F (2,218)	p-level	Eta Squared	Post Hoc
Exercise Behavior Outcomes at Two Weeks								
Moderate Frequency	2.3±3.0	2.1±3.3	2.6±3.0	2.0±2.6	1.06	.348	.010	
Moderate Minutes	84.3±177.5	61.5±101.4	92.6±129.4	93.6±255.5	.696	.500	.006	
Total Frequency	4.1±3.9	3.8±3.9	4.7±4.1	3.6±3.5	2.30	.134	.018	
Total Minutes	136.6±274.6	107.3±167.7	154.9±180.9	140.1±402.5	.535	.587	.005	
Theory of Planned Behavior Outcomes								
Oncologist Belief	6.1±1.2	5.7±1.4	6.2±1.2	6.2±1.1	4.04	.019	.036	
Motivation to Comply	6.2±1.2	5.7±1.5	6.4±.95	6.3±1.0	6.20	.003	.062	RO,RPR>CT
Normative Belief	38.2±11.6	33.6±13.1	39.9±10.9	39.9±10.2	6.96	.001	.061	RO,RPR>CT
Subjective Norm	5.5±1.5	5.2±1.5	5.5±1.6	5.8±1.4	3.14	.045	.028	
Attitude	6.0±1.2	5.9±1.2	6.1±1.2	6.0±1.2	.483	.618	.004	
Perceived Control	5.4±1.6	4.8±1.6	5.8±1.5	5.4±1.5	6.08	.003	.053	RPR>CT
Intention	6.0±1.2	5.4±1.4	6.3±1.1	6.2±.99	13.34	.000	.110	RO,RPR>CT

Data are presented as the mean ± standard deviation for continuous variables. RO = Recommendation Only; RPR = Recommendation Plus Referral; CT = Conventional Treatment

Table 2-3

One-Way Analysis of Variance for Exercise Behavior at Five Weeks (Intention-to-Treat Analyses)

Variable	Overall (n=194)	Conventional Treatment Group (n=55)	Recommendation Only Group (n=75)	Recommendation Plus Referral Group (n=64)	F (2,193)	p-level	Eta Squared	Post Hoc
Exercise Behavior Outcomes								
Moderate Frequency	1.9±2.4	1.6±2.5	2.1±2.5	1.9±2.4	.567	.568	.006	
Moderate Minutes	74.2±113.1	61.3±119.2	81.2±113.8	77.1±107.6	.522	.594	.005	
Total Frequency	4.1±3.9	3.8±3.9	4.7±4.1	3.6±3.5	2.30	.134	.018	
Total Minutes	136.6±274.6	107.3±167.7	154.9±180.9	140.1±402.5	.535	.587	.005	

Data are presented as the mean ± standard deviation for continuous variables.

Exploratory Referral Analyses (Intention-to-Treat Analyses)

The ANOVAs for exercise behavior revealed significant differences for total minutes only [F(3,126)= 4.57, p=.004], no other variable was found to be significant (see Table 2-4). Tukey post hoc analyses indicated that the recommendation plus attended referral was reported significantly more exercise than any other group (see Table 2-4).

Ancillary Dichotomous Intention-to-Treat Analyses

The results of the primary analyses indicated no differences between intervention groups (i.e., recommendation only, recommendation plus referral) on any exercise behavior or TPB outcome, therefore, a second series of analyses were performed with a collapsed intervention group as the between subjects factor (patient/oncologist discussion of exercise versus conventional standard of treatment) on study outcomes.

The analysis of variance (ANOVA) for exercise behavior at two weeks revealed no significant differences for any exercise behavior outcome (see Table 2-5). The ANOVAs for TPB outcomes at two weeks revealed significant differences for oncologist belief [F(1,218)=7.90, p=.005], motivation to comply [F(1,218)=14.23, p<.001], normative belief [F(1,218)=13.98, p<.001], perceived control [F(1,218)=9.71, p=.002], and intention [F(1,218)=26.74, p<.001] (see Table 2-5). The ANOVAs for exercise behavior revealed no significant differences for any exercise behavior outcome (see Table 2-6).

Table 2-4

Exploratory One-Way Analysis of Variance for Exercise Behavior at Five Weeks (Intention-to-Treat Analyses)

Variable	Overall (n=194)	Conventional Treatment Group (n=55)	Recommendation Only Group (n=75)	Recommendation Plus Referral Group (n=56)	Recommendation Plus Attended a Referral (n=8)	F (3,126)	p-level	Post Hoc
Exercise Behavior Outcomes								
Moderate Frequency	1.9±2.4	1.6±2.5	2.1±2.5	1.8±2.4	2.8±2.0	.741	.529	
Moderate Minutes	74.2±113.1	61.3 ±119.2	81.2±113.8	68.9±104.2	134.4±120.8	1.14	.336	
Total Frequency	3.6±2.6	3.4±2.7	3.4±2.7	3.8±2.4	4.5±2.4	.611	.608	
Total Minutes	131.3±140.0	121.3±132.1	137.8±115.7	110.0±111.8	297.5±276.7	4.57	.004	RPRA> ALL

Data are presented as the mean ± standard deviation for continuous variables.

Table 2-5

One-Way Analysis for Behavioral and Theory of Planned Behavior Outcomes at Two Weeks (Intention-to-Treat Analyses, Dichotomous Groups)

Variable	Overall (n=219)	Conventional Treatment Group (n=61)	Recommendation Only, Recommendation Plus Referral Group (n=158)	F (1,218)	p-level	Eta
Exercise Behavior Outcomes						
Moderate Frequency	2.3±3.0	2.1±3.3	2.3±2.9	.280	.597	.001
Moderate Minutes	84.3±177.5	61.5±101.4	93.1±198.8	1.39	.239	.006
Total Frequency	4.1±3.9	3.8±3.9	4.2±3.9	.476	.491	.002
Total Minutes	136.6±274.6	107.3±167.7	147.9±305.8	.960	.328	.004
Theory of Planned Behavior Outcomes						
Oncologist Belief	6.1±1.2	5.7±1.4	6.2±1.1	7.90	.005	.035
Motivation to Comply	6.2±1.2	5.7±1.5	6.4±.97	14.23	.000	.062
Normative Belief	38.2±11.6	33.6±13.1	40.0±10.5	13.98	.000	.061
Subjective Norm	5.5±1.5	5.2±1.5	5.6±1.5	4.34	.038	.020
Attitude	6.0±1.2	5.9±1.2	6.1±1.2	.494	.483	.002
Perceived Control	5.4±1.6	4.9±1.6	5.6±1.5	9.71	.002	.043
Intention	6.0±1.2	5.4±1.4	6.2±1.0	26.74	.000	.110

Data are presented as the mean ± standard deviation for continuous variables.

Table 2-6

One-Way Analysis of Variance or Exercise Behavioral Outcomes at Five Weeks (Intention-to-Treat Analyses, Dichotomous Groups)

Variable	Overall (n=194)	Conventional Treatment Group (n=55)	Recommendation Only, Recommendation Plus Referral Group (n=139)	F (1,193)	p-level	Eta
Exercise Behavior Outcomes						
Moderate Frequency	1.9±2.4	1.6±2.5	2.0±2.4	1.06	.303	.006
Moderate Minutes	61.3±119.2	79.3±110.6	74.2±113.1	1.00	.318	.005
Total Frequency	3.6±2.6	3.4±2.7	3.7±2.5	.774	.380	.004
Total Minutes	131.7±140.0	121.3±132.1	135.8±143.3	.424	.515	.002

Data are presented as the mean ± standard deviation for continuous variables.

Perceived Treatment Analyses

Exercise Behavior and Theory of Planned Behavior Outcomes

The analysis of variance (ANOVA) for exercise behavior at two weeks revealed significant differences for total frequency [F(1,218)= 4.49, p=.012], no other variable was found to be significant (see Table 2-7). The ANOVAs for TPB outcomes at two weeks revealed significant differences for oncologist belief [F(1,218)=7.87, p=.001], motivation to comply [F(1,218)=5.38, p=.005], normative belief [F(1,218)=8.82, p<.001], attitude [F(1,218)=6.68, p=.002], and perceived control [F(1,218)=10.46, p<.001] (see Table 2-7). Tukey follow up post hoc comparisons revealed that in most instances the intervention groups (i.e., recommendation only, recommendation plus referral) had significantly more positive beliefs than the conventional treatment group (see Table 2-7).

The ANOVAs for exercise behavior indicated significant differences for moderate minutes [F(2,193)=4.39, p=.014], moderate frequency [F(2,193)= 2.84, p=.061] and total minutes [F(2,193)=2.47, p=.089] approached significance at five weeks (see Table 2-8). Tukey follow up post hoc comparisons indicated that the recommendation only group reported significantly more exercise than the conventional treatment group (see Table 2-8).

Table 2-7

One-Way Analysis of Variance for Exercise Behavior and Theory of Planned Outcomes at Two Weeks (Perceived Treatment Analyses)

Variable	Overall (n=219)	Exercise Not Discussed (n=69)	Oncologist/Patient Initiated Discussion on Exercise (n=112)	Discussion on Exercise Plus Referral (n=38)	F (2,218)	p-level	Eta Squared	Post Hoc
Exercise Behavior Outcomes								
Moderate Frequency	2.3±3.0	1.9±2.1	2.6±3.4	1.8±2.8	1.77	.172	.016	
Moderate Minutes	84.3±177.5	64.4±105.3	94.0±188.8	93.1±239.1	.631	.533	.006	
Total Frequency	4.1±3.9	3.2±3.0	4.8±4.4	3.3±3.0	4.49	.012	.040	
Total Minutes	136.6±274.6	85.3±111.2	160.1±335.4	160.4±277.5	1.77	.173	.016	
Theory of Planned Behavior Outcomes								
Oncologist Belief	6.1±1.2	5.6±1.4	6.3±1.0	6.2±1.1	7.87	.001	.068	RO,RPR>CT
Motivation to Comply	6.2±1.2	5.8±1.4	6.3±1.1	6.5±.82	5.38	.005	.047	RO,RPR>CT
Normative Belief	38.2±11.6	33.5±12.7	40.2±10.7	40.7±9.6	8.82	.000	.076	RO,RPR>CT
Subjective Norm	5.5±1.5	5.1±1.6	5.7±1.5	5.7±1.5	3.09	.047	.028	
Attitude	6.0±1.2	5.6±1.5	6.2±1.0	6.3±.88	6.68	.002	.058	RO,RPR>CT
Perceived Control	5.4±1.6	5.0±1.7	5.6±1.6	5.4±1.3	3.11	.047	.028	
Intention	6.0±1.2	5.5±1.5	6.2±.90	6.3±1.2	10.46	.000	.088	RO,RPR>CT

Data are presented as the mean ± standard deviation for continuous variables. RO = Recommendation Only; RPR = Recommendation Plus Referral; CT = Conventional Treatment.

Table 2-8

One-Way Analysis of Variance for Exercise Behavior at Five Weeks (Perceived Treatment Analyses)

Variable	Overall (n=194)	Conventional Treatment Group (n=59)	Recommendation Only Group (n=102)	Recommendation Plus Referral Group (n=33)	F (2,193)	p-level	Eta Squared	Post Hoc
Exercise Behavior Outcomes								
Moderate Frequency	1.9±2.5	1.4±2.4	2.3±2.6	1.6±1.9	2.84	.061	.029	
Moderate Minutes	74.6±113.9	45.2±84.6	97.2±130.9	58.0±87.7	4.39	.014	045	RO>CT
Total Frequency	3.6±2.6	3.3±2.8	3.9±2.5	3.3±2.5	1.53	.219	.016	
Total Minutes	132.4±140.9	98.6±112.3	146.0±136.7	150.6±186.2	2.47	.089	.025	

Data are presented as the mean ± standard deviation for continuous variables. RO = Recommendation Only; RPR = Recommendation Plus Referral; CT = Conventional Treatment

Exploratory Referral Analyses (Perceived Treatment Analyses)

The analysis of variance (ANOVA) for exercise behavior at five weeks revealed significant differences for moderate minutes [F(3,193)= 3.48, p=.0.17], total minutes [F(3,193)= 5.43, p=.0.01] and moderate frequency approached significance [F(3,193)=2.40, p=.069] (see Table 2-9). Tukey post hoc analyses indicated that the recommendation plus attended referral was reported significantly more exercise than any other group (see Table 2-9).

Table 2-9

Exploratory One-Way Analysis of Variance for Exercise Behavior at Five Weeks (Perceived Treatment Analyses)

Variable	Overall (n=194)	Conventional Treatment Group (n=59)	Recommendation Only Group (n=100)	Recommendation Plus Referral Group (n=27)	Recommendation Plus Attended a Referral (n=8)	F (3,193)	p-level	Post Hoc
Exercise Behavior Outcomes								
Moderate Frequency	1.9±2.4	1.4±2.4	2.3±2.6	1.4±2.0	2.8±2.0	2.40	.069	
Moderate Minutes	74.2±113.1	44.5±84.1	92.8±127.5	52.4±91.4	134.4±120.8	3.48	.017	RPRA> ALL
Total Frequency	3.6±2.6	3.3±2.8	3.9±2.5	3.1±2.4	4.5±2.4	1.56	.201	
Total Minutes	131.3±140.0	99.0±111.3	141.6±135.0	117.2±127.7	297.5±276.7	5.43	.001	RPRA> ALL

Data are presented as the mean ± standard deviation for continuous variables. RO = Recommendation Only; RPR = Recommendation Plus Referral; RPRA = Recommendation Plus Attended Referral CT = Conventional Treatment

Dichotomous Perceived Treatment Analyses

As with the intention-to-treat analyses there were no differences between intervention groups (i.e., recommendation only, recommendation plus referral) on any exercise behavior or TPB outcome, therefore, a second series of analyses were performed using the dichotomous experimental group as the between subjects factor. The ANOVAs for exercise behavior at two weeks revealed significant differences for total frequency [$F(1,218)= 4.68$, $p=.031$] no other exercise variable was found to be significant (see Table 2-10). The ANOVAs for TPB outcomes at two weeks revealed significant differences for oncologist belief [$F(1,218)=15.79$, $p<.001$], motivation to comply [$F(1,218)=10.16$, $p=.002$], normative belief [$F(1,218)=17.66$, $p<.001$], attitude [$F(1,218)=13.18$, $p<.001$], and intention [$F(1,218)=21.04$, $p<.001$] (see Table 2-10). Tukey follow up post hoc comparisons revealed that in most instances the intervention groups (i.e., recommendation only, recommendation plus referral) had significantly more positive beliefs than the conventional treatment group (see Table 2-10).

The ANOVAs for exercise behavior revealed significant differences for moderate minutes [$F(1,193)=6.00$, $p=.015$], total minutes [$F(1,193)= 4.72$, $p=.031$] and moderate frequency approached significance at five weeks [$F(1,193)= 3.86$, $p=.051$] (see Table 2-11).

Table 2-10

One-Way Analysis of variance for Behavioral and Theory of Planned Behavior Variables at Two Weeks (Perceived Treatment, Dichotomous Groups)

Variable	Overall (n=219)	Conventional Treatment Group (n=69)	Recommendation only, Recommendation Plus Referral Group (n=150)	F (1,218)	p-level	Eta
Exercise Behavior Outcomes						
Moderate Frequency	2.3±3.0	1.9±2.1	2.4±3.3	1.22	.270	.006
Moderate Minutes	84.3±177.5	64.4±105.3	93.4±201.9	1.26	.261	.006
Total Frequency	4.1±3.9	3.2±3.0	4.4±4.1	4.68	.031	.021
Total Minutes	136.6±274.6	85.3±111.2	160.2±320.8	3.55	.061	.016
Theory of Planned Behavior Outcomes						
Oncologist Belief	6.1±1.2	5.6±1.4	6.3±1.1	15.79	.000	.068
Motivation to Comply	6.2±1.2	5.8±1.4	6.4±1.0	10.16	.002	.045
Normative Belief	38.2±11.6	33.5±12.7	40.3±10.4	17.66	.000	.075
Subjective Norm	5.5±1.5	5.1±1.6	5.7±1.5	6.21	.013	.028
Attitude	6.0±1.2	5.6±1.5	6.2±.98	13.18	.000	.057
Perceived Control	5.4±1.6	5.0±1.7	5.6±1.5	5.56	.019	.025
Intention	6.0±1.2	5.5±1.5	6.2±.97	21.04	.000	.088

Data are presented as the mean ± standard deviation for continuous variables.

Table 2-11

One-Way Analysis of variance for Exercise Behavior and Theory of Planned Behavior Variables at Five Weeks (Perceived Treatment, Dichotomous Groups)

Variable	Overall (n=194)	Conventional Treatment Group (n=59)	Recommendation Only, Recommendation Plus Referral Group (n=135)	F (1,193)	p-level	Eta
Exercise Behavior Outcomes						
Moderate Frequency	1.9±2.4	1.4±2.4	2.1±2.4	3.86	.051	.017
Moderate Minutes	74.2±113.1	44.5±84.1	87.2±121.7	6.00	.015	.028
Total Frequency	3.64±2.58	3.27±2.80	3.80±2.47	1.74	.188	.009
Total Minutes	131.6±140.0	98.9±111.3	145.9±148.9	4.71	.031	.022

Data are presented as the mean ± standard deviation for continuous variables.

Perceived Intended Treatment Analyses

Exercise Behavior and Theory of Planned Behavior Outcomes

The ANOVAs for exercise behavior at two weeks revealed significant differences for total frequency [F(2,139)= 3.15, p=.046] and total minutes approached significance [F(2,139)= 2.80, p=.064]. No other variable was found to be significant (see Table 2-12). The ANOVAs for TPB outcomes at two weeks revealed significant differences for oncologist belief [F(2,139)=7.70, p=.001], motivation to comply [F(2,139)=10.34, p<.001], normative belief [F(2,139)=12.30, p<.001], perceived control [F(2,139)=6.76, p=.002], and intention [F(2,139)=21.17, p<.001] (see Table 2-12). Tukey follow up post hoc comparisons revealed that in most instances the intervention groups (i.e., recommendation only, recommendation plus referral) had significantly more positive beliefs than the conventional treatment group (see Table 2-12).

The ANOVAs for exercise behavior revealed moderate minutes approached significance [F(2,125)= 2.64, p=.075], no other variable approached significance at five weeks (see Table 2-13).

Table 2-12
One-Way Analysis of Variance for Exercise Behavior Theory of Planned Outcomes at Two Weeks (Perceived Intended Treatment Analyses)

Variable	Overall (n=140)	Conventional Treatment Group (n=37)	Recommendation Only Group (n=70)	Recommendation Plus Referral Group (n=33)	F (2,139)	p-level	Eta Squared	Post Hoc
Exercise Behavior Outcomes								
Moderate Frequency	2.3±3.0	1.6±2.1	2.7±3.2	2.2±3.1	1.62	.202	.023	
Moderate Minutes	81.2±155.2	49.0±83.4	86.6±118.2	108.5±254.4	1.35	.261	.019	
Total Frequency	4.2±3.9	3.2±3.2	5.0±4.3	3.8±3.6	3.15	.046	.044	
Total Minutes	132.1±186.0	71.3±95.7	158.0±182.7	145.3±249.2	2.80	.064	.039	
Theory of Planned Behavior Outcomes								
Oncologist Belief	6.1±1.2	5.4±1.5	6.4±1.0	6.3±1.1	7.70	.001	.101	RO,RPR>CT
Motivation to Comply	6.3±1.1	5.6±1.5	6.5±.84	6.5±.66	10.34	.000	.131	RO,RPR>CT
Normative Belief	38.9±11.4	31.5±13.1	41.6±9.8	41.3±8.8	12.30	.000	.152	RO,RPR>CT
Subjective Norm	5.4±1.5	5.0±1.4	5.6±1.5	5.7±1.4	2.80	.066	.039	
Attitude	6.1±1.2	5.6±1.4	6.3±1.1	6.2±.91	3.87	.023	.054	
Perceived Control	5.5±1.6	4.7±1.7	5.8±1.5	5.5±1.4	6.76	.002	.090	RO,RPR>CT
Intention	6.1±1.1	5.1±1.3	6.4±.88	6.4±.78	21.17	.000	.236	RO,RPR>CT

Data are presented as the mean ± standard deviation for continuous variables. RO = Recommendation Only; RPR = Recommendation Plus Referral; CT = Conventional Treatment

Table 2-13

One-Way Analysis of Variance for Exercise Behavior at Five Weeks (Perceived Intended Treatment Analyses)

Variable	Overall (n=126)	Conventional Treatment Group (n=32)	Recommendation Only Group (n=64)	Recommendation Plus Referral Group (n=30)	F (2,125)	p-level	Eta Squared	Post Hoc
Exercise Behavior Outcomes								
Moderate Frequency	2.0±2.5	1.5±2.5	2.3±2.5	1.7±2.1	1.51	.225	.025	
Moderate Minutes	72.8±106.6	43.3±82.9	93.6±120.7	60.3±89.7	2.64	.075	.042	
Total Frequency	3.5±2.6	3.0±2.8	3.9±2.5	3.1±2.5	1.82	.166	.030	
Total Minutes	128.5±142.8	89.0±95.7	148.0±138.9	128.8±182.4	1.80	.171	.029	

Data are presented as the mean ± standard deviation for continuous variables. RO = Recommendation Only; RPR = Recommendation Plus Referral; CT = Conventional Treatment

Exploratory Referral Analyses (Perceived Intended Treatment Analyses)

The ANOVAs for exercise behavior revealed significant differences for moderate minutes [$F(2,125)=2.75$, $p=.046$] and total minutes [$F(2,125)=6.30$, $p=.001$] at five weeks. No other variable was found to be significant (see Table 2-14).

Table 2-14

Exploratory One-Way Analysis of Variance for Exercise Behavior Outcomes at Five Weeks (Perceived Intended Treatment Analyses)

Variable	Overall (n=128)	Conventional Treatment Group (n=32)	Recommendation Only Group (n=64)	Recommendation Plus Referral Group (n=24)	Recommendation Plus Attended a Referral (n=8)	F (2,126)	p-level	Post Hoc
Exercise Behavior Outcomes								
Moderate Frequency	2.0±2.5	1.4±2.5	2.4±2.5	1.6±2.2	2.8±2.0	1.61	.191	
Moderate Minutes	75.5±108.6	42.0 ±82.0	93.0±118.9	54.6±94.4	134.4±120.8	2.75	.046	RPRA> CTRPR
Total Frequency	3.5±2.5	3.0±2.8	3.9±2.4	2.7±2.3	4.5±2.4	2.20	.092	
Total Minutes	129.9±142.0	90.0±94.3	145.5±137.4	85.8±98.3	297.5±276.7	6.30	.001	RPRA> ALL

Data are presented as the mean ± standard deviation for continuous variables. RO = Recommendation Only; RPR = Recommendation Plus Referral; RPRA = Recommendation Plus Attended Referral CT = Conventional Treatment

Dichotomous Perceived Intended Treatment Analyses

As with the previous two analyses there were no differences between intervention groups (i.e., recommendation only, recommendation plus referral) on any behavioral or TPB outcome, therefore ANOVAs were performed using the dichotomous experimental group.

The ANOVAs for exercise behavior at two weeks revealed significant differences for total frequency [$F(1,139)= 3.95$, $p=.049$] and total minutes [$F(1,139)= 5.54$, $p=.020$] (see Table 2-15). The ANOVAs for TPB outcomes at two weeks revealed significant differences for oncologist belief [$F(1,139)=15.51$, $p<.001$], motivation to comply [$F(1,139)=20.77$, $p<.001$], normative belief [$F(1,139)=24.77$, $p<.001$], attitude [$F(1,139)=7.64$, $p=.006$], perceived control [$F(1,139)=12.12$, $p=.001$], and intention [$F(1,139)=42.62$, $p<.001$] (see Table 2-15).

The ANOVAs for exercise behavior revealed total minutes approached significance [$F(1,125)=3.06$, $p=.082$] at five weeks. No other variable was significant (see Table 2-16; for a summary of effect sizes across the three different analyses see Table 2-17 and 2-18).

Table 2-15

One-Way Analysis of Variance for Exercise Behavior and Theory of Planned Behavior Outcomes at Two Weeks (Perceived Intended Treatment, Dichotomous Groups)

Variable	Overall (n=140)	Conventional Treatment Group (n=37)	Recommendation Only, Recommendation Plus Referral Group (n=103)	F (1,139)	p-level	Eta
Exercise Behavior Outcomes						
Moderate Frequency	2.3±2.9	1.6±2.1	2.5±3.2	2.55	.112	.018
Moderate Minutes	81.8±155.2	49.0±83.4	93.6±172.8	2.26	.134	.016
Total Frequency	4.2±3.9	3.2±3.2	4.6±4.1	3.95	.049	.028
Total Minutes	132.1±186.0	71.3±95.7	153.9±205.2	5.54	.020	.039
Theory of Planned Behavior Outcomes						
Oncologist Belief	6.1±1.2	5.4±1.5	6.3±1.0	15.51	.000	.101
Motivation to Comply	6.3±1.1	5.6±1.5	6.5±.78	20.77	.000	.131
Normative Belief	38.9±11.4	31.4±13.1	42.0±9.4	24.77	.000	.152
Subjective Norm	5.4±1.5	4.9±1.4	5.6±1.5	5.47	.021	.038
Attitude	6.1±1.2	5.6±1.4	6.2±1.0	7.64	.006	.053
Perceived Control	5.4±1.6	4.9±1.6	5.6±1.5	12.12	.001	.081
Intention	6.1±1.1	5.1±1.3	6.4±.85	42.62	.000	.236

Data are presented as the mean ± standard deviation for continuous variables.

Table 2-16

One-Way Analysis for Exercise Behavior at Five Weeks (Perceived Intention-to-Treat Analyses, Dichotomous Groups)

Variable	Overall (n=126)	Conventional Treatment Group (n=32)	Recommendation Only, Recommendation Plus Referral Group (n=94)	F (1,125)	p-level	Eta
Exercise Behavior Outcomes						
Moderate Frequency	2.0±2.5	1.4±2.5	2.1±2.4	2.10	.150	.017
Moderate Minutes	72.2±105.5	42.0±81.9	82.4±111.0	3.58	.061	.028
Total Frequency	3.5±2.5	3.0±2.8	3.6±2.5	1.63	.204	.013
Total Minutes	127.4±141.3	90.0±94.3	140.2±152.4	3.06	.082	.024

Data are presented as the mean ± standard deviation for continuous variables.

Table 2-17

Descriptive Effect Sizes Across Groups for Exercise Behavior and Theory of Planned Behavior at Two and Five Weeks

Variable	Intention-to-Treat (n=219)	Perceived Treatment (n=219)	Perceived Intended Treatment (n=140)
Exercise Behavior at Two Weeks			
Moderate Frequency	.010	.016	.023
Moderate Minutes	.006	.006	.019
Total Frequency	.018	.040*	.044*
Total Minutes	.005	.016	.039†
Exercise Behavior at Five Weeks			
Moderate Frequency	.006	.029†	.025
Moderate Minutes	.005	.045*	.042†
Total Frequency	.005	.016	.030
Total Minutes	.002	.025†	.029
Theory of Planned Behavior			
Oncologist Belief	.036*	.068**	.101**
Motivation to Comply	.062**	.047**	.131***
Normative Belief	.061**	.076***	.152***
Subjective Norm	.028*	.028*	.039†
Attitude	.004	.058**	.054*
Perceived Control	.053**	.028*	.090*
Intention	.110***	.088***	.236***

***p<.001; **p<.01; *p<.05;†p<.10.

Table 2-18

Descriptive Effect Sizes Across Dichotomous Groups For Exercise Behavior and Theory of Planned Behavior Outcomes at Two and Five Weeks

Variable	Intention-to-Treat (n=219)	Perceived Treatment (n=219)	Perceived Intended Treatment (n=140)
Exercise Behavior at Two Weeks			
Moderate Frequency	.001	.006	.018
Moderate Minutes	.006	.006	.016
Total Frequency	.002	.021*	.028*
Total Minutes	.004	.016†	.039*
Exercise Behavior at Five Weeks			
Moderate Frequency	.006	.020*	.017
Moderate Minutes	.005	.030*	.028†
Total Frequency	.004	.009	.013
Total Minutes	.002	.024*	.024†
Theory of Planned Behavior			
Oncologist Belief	.035**	.068***	.101***
Motivation to Comply	.062***	.045**	.131***
Normative Belief	.061***	.075***	.152***
Subjective Norm	.020*	.028*	.038*
Attitude	.002	.057***	.053**
Perceived Control	.043**	.025*	.081**
Intention	.110***	.088***	.236***

***p<.001; **p<.01; *p<.05; †p<.10.

Path Analysis of Exercise Behavior Outcomes by TPB Variables (Intent-to-Treat Analyses)

All TPB variables were examined as possible mediators and all exercise behavior outcomes at five weeks as dependent variables (see Table 2-19 and 2-20). Given that there were no differences between intervention groups on dependent outcomes, dichotomous groups (i.e., conventional treatment group versus recommendation only and recommendation plus referral group) were used in the path analyses. Unfortunately, the intent-to-treat analysis indicated no significant relationship between the independent variable (experimental condition) and the dependent variable (exercise behavior) therefore the analysis was stopped at this point.

Table 2-19

Descriptive Statistics and Correlations Among Theory of Planned Behavior Outcomes and Exercise Behavior at Two Weeks

	Moderate Frequency	Moderate Minutes	Total Frequency	Total Minutes
1. Oncologist Belief	.02	-.01	.08	.01
2. Motivation to Comply	.04	.07	.09	.07
3. Normative Belief	.03	.03	.09	.05
4. Subjective Norm	-.02	.01	-.06	.02
5. Attitude	.08	.11	.14*	.14*
6. Perceived Control	.18**	.12	.20**	.13
7. Behavioral Intention	.08	.13	.11	.16*
Mean	2.27	84.26	4.06	136.59
SD	2.97	177.45	3.86	274.61

p<.05 (two-tailed); **p<.01 (two-tailed)

Table 2-20

Descriptive Statistics and Correlations Among Theory of Planned Behavior Outcomes and Exercise Behavior at Five Weeks

	Moderate Frequency	Moderate Minutes	Total Frequency	Total Minutes
1. Oncologist Belief	.06	.06	.06	.08
2. Motivation to Comply	.08	.12	-.02	.08
3. Normative Belief	.08	.10	-.01	.10
4. Subjective Norm	.03	.09	.02	.10
5. Attitude	.06	.12	.13	.22**
6. Perceived Control	.20**	.20**	.16**	.21**
7. Behavioral Intention	.10	.08	.09	.13*
Mean	1.91	74.20	3.64	131.67
SD	2.43	113.10	2.58	140.0

*p<.05 (two-tailed); **p<.01 (two-tailed)

Path Analysis of Behavioral Outcomes by Theory of Planned Behavior Variables (Perceived Treatment Analyses)

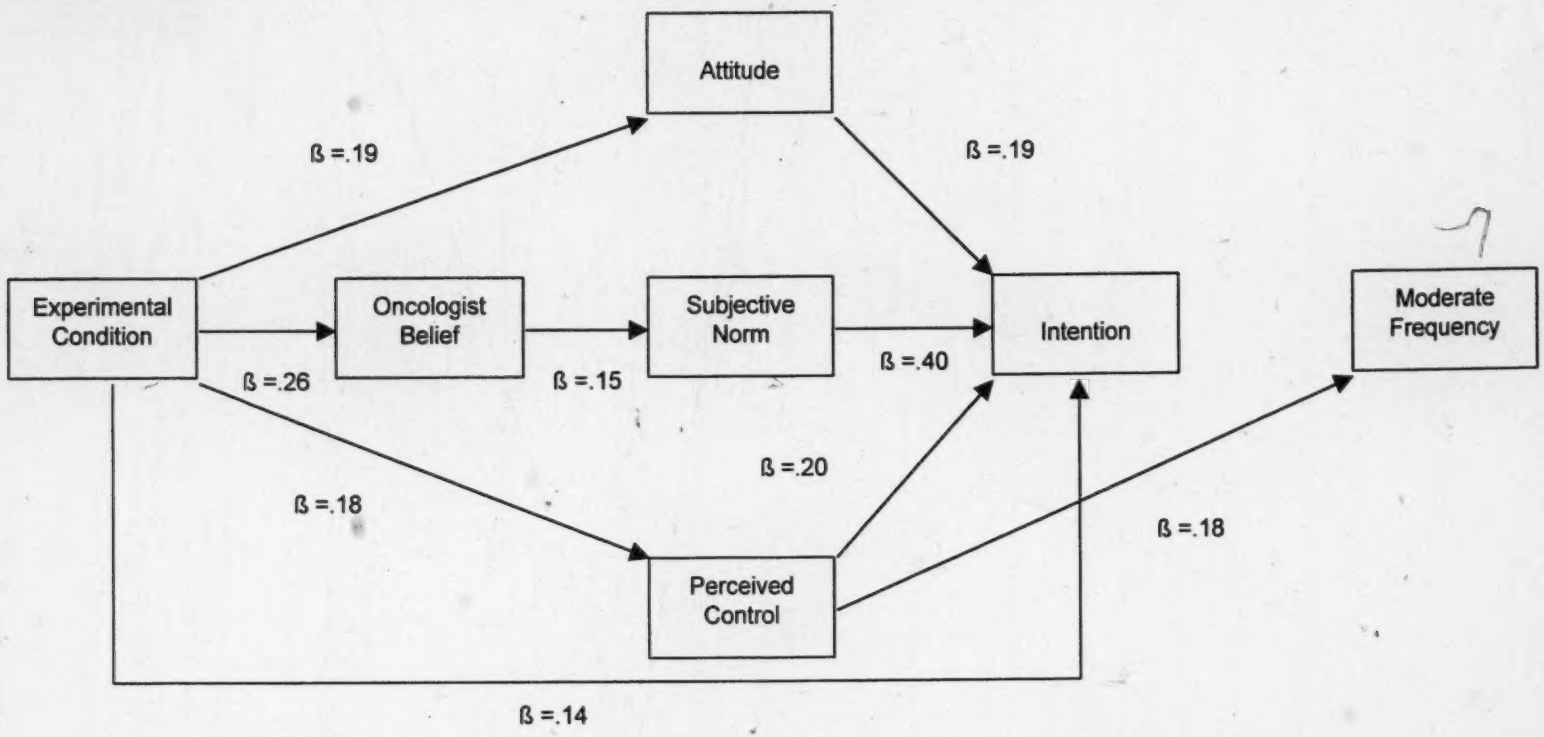
All TPB variables were examined as possible mediators and exercise behavior outcomes at five weeks as dependent variables (see Table 19 and Table 20). Again, there were no differences between intervention groups on dependent outcomes, therefore, dichotomous groups (i.e., conventional treatment group versus recommendation only and recommendation plus referral group) were used in the path analyses. The first step of the analysis indicated significant effects for moderate frequency, moderate minutes and total minutes (see Table 2-18) therefore, these behavioral outcomes were used as dependent variables in the subsequent path analyses.

In the first path analysis, moderate frequency was regressed on all salient variables (see Figure 2-4). Direct effects were indicated for perceived control (ß=.18;p=.020). Next, intention was regressed on all remaining salient variables. Direct effects were indicated for attitude (ß=.19;p=.001), subjective norm (ß=.40;p<.001) and perceived control (ß=.20;p<.001). In the next step, attitude, subjective norm, and perceived control were regressed separately on all remaining variables. For attitude, a direct effect was indicated for experimental condition (ß=.19; p=.004). For subjective norm, a direct effect was indicated for oncologist belief (ß=.15; p=.035). For perceived control, a direct effect was indicated for experimental condition (ß=.14; p=.019). Finally, a direct effect was indicated when

oncologist belief was regressed on experimental condition (ß=.26;p<.001)

Figure 2-4

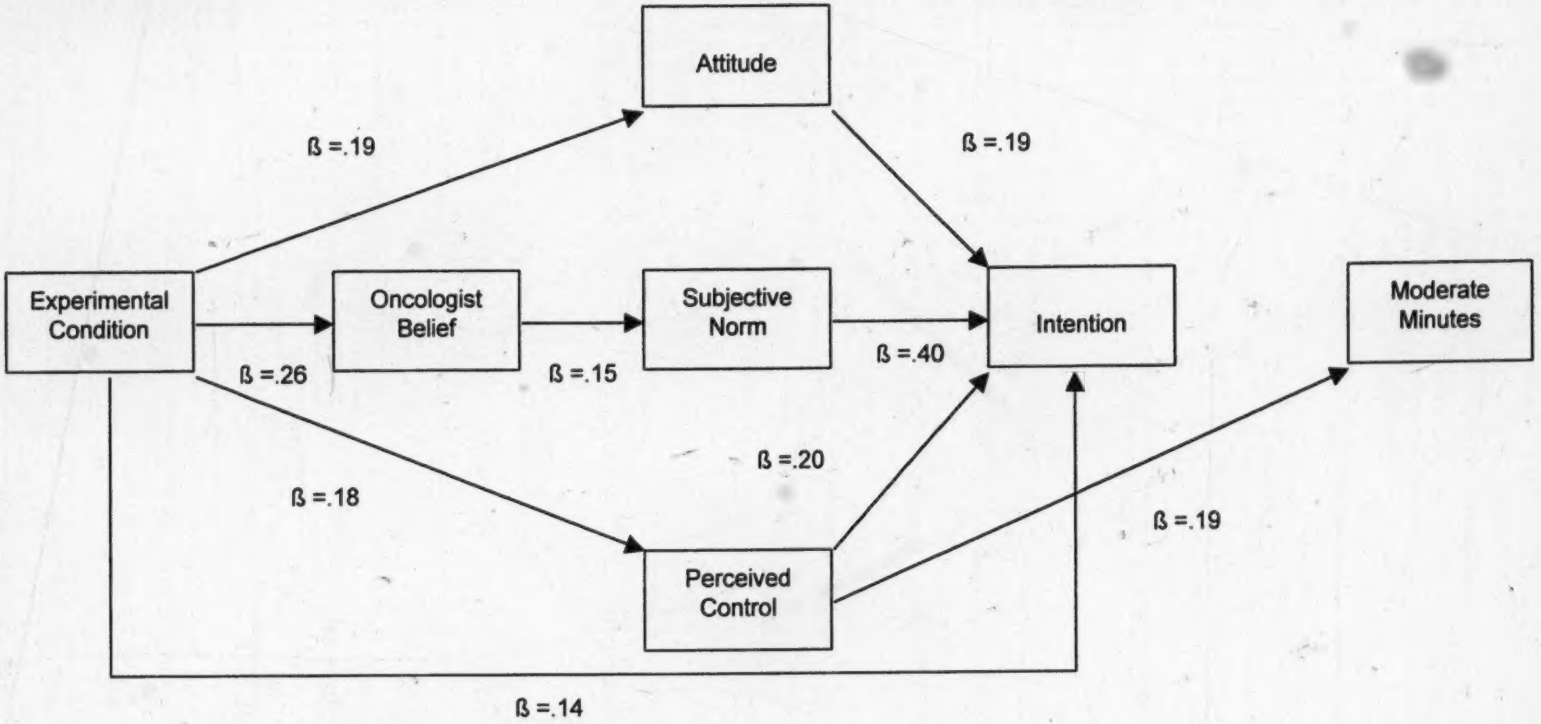
Path model showing relationships among experimental condition, theory of planned behavior constructs and moderate frequency (Perceived Treatment Analyses)



In the second path analysis, moderate minutes was regressed on all salient variables (see Figure 2-5). Direct effects were indicated for perceived control (ß=.19;p=.012). Next, intention was regressed on all remaining salient variables. Direct effects were indicated for attitude (ß=.19;p=.001), subjective norm (ß=.40;p<.001) and perceived control (ß=.20;p<.001). In the next step, attitude, subjective norm, and perceived control were regressed separately on all remaining variables. For attitude, a direct effect was indicated for experimental condition (ß=.19; p=.004). For subjective norm, a direct effect was indicated for oncologist belief (ß=.15; p=.035). For perceived control, a direct effect was indicated for experimental condition (ß=.14; p=.019). Finally, a direct effect was indicated when oncologist belief was regressed on experimental condition (ß=.26;p<.001).

Figure 2-5

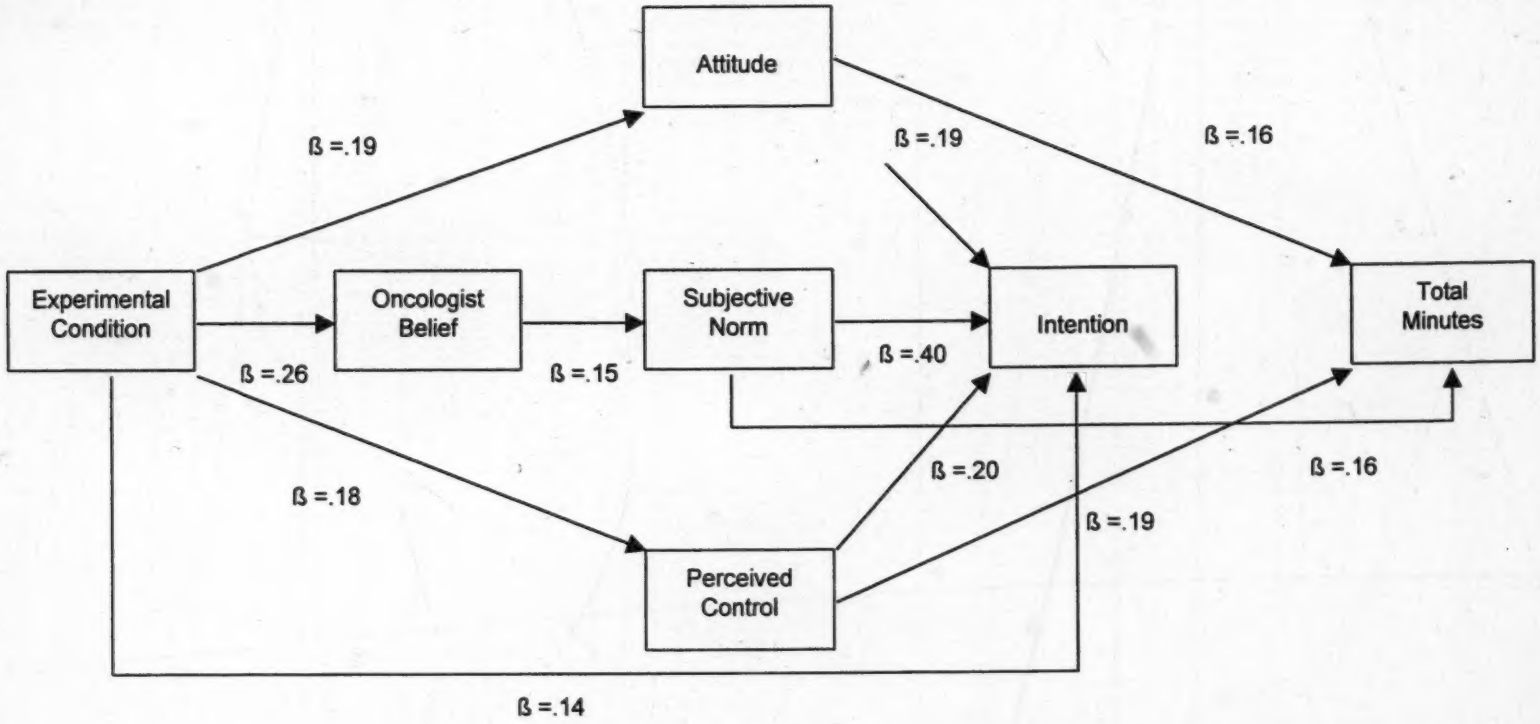
Path model showing relationships among experimental condition, theory of planned behavior constructs and moderate minutes (Perceived Treatment Analyses)



Finally, in the third path analysis total minutes were regressed on all salient variables (see Figure 2-6). Direct effects were indicated for perceived control (ß=.19;p=.013). Next, intention was regressed on all remaining salient variables. Direct effects were indicated for attitude (ß=.19;p=.001), subjective norm (ß=.40;p<.001) and perceived control (ß=.20;p<.001). In the next step, attitude, subjective norm, and perceived control were regressed separately on all remaining variables. For attitude, a direct effect was indicated for experimental condition (ß=.19; p=.004). For subjective norm, a direct effect was indicated for oncologist belief (ß=.15; p=.035). For perceived control, a direct effect was indicated for experimental condition (ß=.14; p=.019). Finally, a direct effect was indicated when oncologist belief was regressed on experimental condition (ß=.26;p<.001).

Figure 2-6

Path model showing relationships among experimental condition, theory of planned behavior constructs and total minutes (Perceived Treatment Analyses)



Path Analysis of Behavioral Outcomes by Theory of Planned Behavior Variables (Perceived Intended Treatment Analyses)

All TPB variables were examined as possible mediators and all exercise behavior outcomes at five weeks as dependent variables (see Table 2-19 and 2-20). Given that there were no differences between intervention groups on dependent outcomes, dichotomous groups (i.e., conventional treatment group versus recommendation only and recommendation plus referral group) were used in the path analyses. Unfortunately, the perceived intended treatment analysis indicated no significant relationship between the independent variable (experimental condition) and the dependent variable (exercise behavior) therefore the analysis was stopped at this point.

Discussion

National organizations have recently acknowledged the potential role of physicians and other health care providers in promoting exercise (e.g., Chakravarthy et al., 2002; Ford, Giles, & Dietz, 2002). These observations have been confirmed by numerous studies consistently demonstrating that physician-based exercise counseling can produce short-term exercise increases in previously sedentary individuals (e.g., Simons-Morton et al., 2001). Several important barriers (e.g., time, lack of knowledge) have been identified that may prevent physicians from providing exercise advice (e.g., Swinburn et al., 1998). In the cancer setting, medical consultations are often a stressful period for patient and practitioner and oncologists are even less likely than family physicians to receive training in behavioral counseling. Therefore, this trial was designed to overcome these barriers by developing simple and structured intervention materials feasible for the cancer setting. Specifically, the present study examined the effects of an oncologist recommendation on exercise motivation in newly diagnosed breast cancer survivors.

This is the first study to promote exercise in cancer survivors and to do so using an oncologist-based intervention in a randomized controlled design. Several major findings were revealed. First, the intention-to-treat analyses indicated that an oncologist recommendation had minimal effects on exercise behavior but strong effects on social cognitive determinants of exercise behavior change. Second, a

large minority of newly diagnosed female breast cancer survivors may not accurately recall which psychosocial and behavioral issues were discussed during a treatment consultation. Third, ancillary analyses indicated that a perceived oncologist recommendation had stronger effects on exercise behavior and social cognitive determinants of exercise. Fourth, the effects of an oncologist's recommendation on exercise behavior were in some instances mediated by social cognitive determinants. Finally, an individualized fitness/lifestyle consultation may be a feasible and effective method to increase exercise behavior in newly diagnosed breast cancer survivors.

Exercise Behavior Outcomes

A preliminary finding of the present study was that very brief oncologist recommendation had minimal effects on exercise behavior among newly diagnosed breast cancer survivors. These results only provide partial support for previous reports demonstrating the short-term effects of physician-based counseling in healthy populations (Simons-Morton et al., 2001). There may be several possible explanations for the lack of effects. First, previous studies have examined the effectiveness of physician-based exercise counseling plus additional behavioral change techniques (i.e., booster phone calls, written educational materials) on exercise behavior. Therefore, the effectiveness of physician-based exercise counseling alone has never been determined (Simons-Morton et al., 2001). Moreover, a cancer consultation is often a stressful period for the cancer

survivor and oncologist, the main purpose of which is the selection and initiation of treatment (Hack et al., 1998). Moreover, oncologists are even less likely than general physicians to receive training in behavioral counseling, therefore, to increase the feasibility and acceptability of the intervention in clinical practice, oncologists were required to recommend rather than counsel on exercise. Consequently, a 30-second recommendation to exercise does not appear to be as influential as 3 to 5 mins of structured counseling. Second, previous studies have examined the effectiveness of physician-based exercise interventions in sedentary adults who are largely asymptomatic. Consequently, the effectiveness of physician-based exercise interventions on cancer survivors undergoing intensive medical treatments with possible co-morbidities, may be very different.

Theory of Planned Behavior Outcomes

Recent theorizing has suggested using theory-based information in the development and implementation of behavior change initiatives (Fishbein,von Haeften, & Appleyard 2001, Ajzen, 2002a). Based on these concepts, the current intervention was based on preliminary TPB research indicating that an oncologist exercise recommendation may be an important determinant of exercise behavior in breast cancer survivors (Courneya et al., 2001). As hypothesized, the intervention had significant effects on subjective norm and normative belief, thus corroborating earlier preliminary TPB research and confirming the efficacy of incorporating theory-based information in the development and implementation of behavior

change interventions (Ajzen, 2002a; Fishbein, 2001. Montano, Kasprzyk, von Haeften, & Fishbein, 2001). Again, there were no differences between intervention groups.

An interesting finding was the unexpected effect of the intervention on perceived control. In hindsight, the effect of an oncologist's recommendation on breast cancer survivors perceived control seems plausible. The benefits and safety of physical exercise as a quality of life and coping intervention for cancer survivors undergoing adjuvant treatment is quite novel. Consequently, many survivors may feel that initiating or maintaining their current exercise regimen may be beyond their capability and control. Subsequently, receiving exercise advice from a credible and trusted source (i.e., oncologist) may go someway in restoring these feelings of control and capability ('I must be physically able to exercise or my oncologist would not have recommended it') that may directly influence exercise behavior.

The lack of effect on attitude is interesting considering the intervention impacted all remaining components of the TPB. One possible explanation for these findings may be that the intervention was designed to impact intention and behavior via normative processing routes not attitudinal routes (the effect on perceived behavioral control was not hypothesized). Attitude is a persons favorable or unfavorable thoughts toward the designated behavior (Ajzen, 1991), in this study the instrumental (important/ unimportant) aspects of attitude were

measured. Thus, following a treatment consultation, cancer survivors may still consider exercise unimportant during adjuvant therapy even if their oncologist recommended it. Although attitude did not reach statistical significance, participants in the intervention groups consistently reported more positive attitudes than participants assigned to the conventional treatment group. Thus, the lack of effect may be a result of insufficient power among experimental groups to detect statistical significance differences (Cohen, 1988; 1992).

Perceived Treatment/Perceived Intended Treatment Analyses

The primary analysis procedure assumes that the group assignment was correctly delivered by the oncologist and correctly perceived by the participant. However, results suggest that 40%, 16%, and 57% of participants assigned to the conventional treatment, the recommendation only and the recommendation plus referral group respectively, perceived the incorrect group assignment. These findings are consistent with studies that have examined patient recall of important information after attending a cancer treatment consultation (Rylance, 1992; Siminoff, 1989). In general, recall is often hindered by the oncologists' use of medical terminology, patient denial of medical diagnosis, and psychological distress/anxiety caused by medical results (Hack et al., 1998).

As a result of these findings, ancillary analyses were performed to determine the effect of a perceived treatment/perceived intended treatment oncologist recommendation on the primary outcomes. Results of these analyses

indicated even stronger effects between experimental groups on multiple TPB (including attitude) and stronger effects on exercise behavior, although only one analysis reached statistical significance (all effects were significant using a two-tailed confidence test). Moreover, the effect sizes of the perceived intended treatment analyses were consistently higher (on most TPB outcomes) than in any other analysis. It is quite conceivable that in the intention-to-treat and the perceived treatment analyses, participants may have inaccurately recalled if exercise was discussed or not during the consultation. One possible explanation for these findings is that exercise was only briefly mentioned during the consultation, therefore it is possible that participants did consider this brief recommendation as a discussion of exercise. Also, oncologists' were instructed to provide an exercise recommendation at an appropriate time during the consultation. In some instances, exercise may have been recommended early in the consultation, therefore with the average consultation lasting anywhere between 20 and 60 minutes, it is possible that participants may have forgotten what issues were initially discussed.

As a result, these participants may be unsure of their oncologists' feelings towards their participation in an exercise regimen, which may result in weaker exercise beliefs. Alternatively, in the perceived intended treatment analyses, participants accurately recalled their oncologist's exercise recommendation. Consequently, these participants may be more aware of their oncologists' feelings,

which may result in stronger exercise beliefs. From an applied perspective, these results suggest that effective 'patient-physician' communication can significantly impact newly diagnosed breast cancer survivors beliefs and behavior. Therefore, methods to improve oncologist-survivor communication and the retention of information (e.g., audio recording of oncology consultation) are warranted (Hack et al., 1998).

Path Analyses

Previous physician-based counseling trials have incorporated behavioral theory (i.e., Transtheoretical Model, Social Cognitive Theory) as the basis of their exercise interventions (e.g., Marcus et al., 1997; Simons-Morton et al., 2001). In the majority of these studies physicians have delivered an exercise message designed to impact specific mediators of physical exercise behavior. However, few studies have examined the mechanisms of behavioral change (Baranowski et al., 1998; Pinto, Lynn, Marcus, DePue, & Goldstein, 2001; Rejeski, Shelton, Miller, Dunn, King et al., 2001). Based on the postulates of the TPB, in the present study, intention and perceived control were explored as potential mediators of exercise behavior outcomes. The present intervention focused on an oncologist recommendation for exercise therefore, it was hypothesized that intention would be mediated by TPB normative components (i.e., subjective norm, normative belief).

As expected, the three path analyses indicated that perceived control had a

direct effect on exercise behavior. These findings corroborated previous reports indicating that exercise during cancer treatment in cancer survivors was predicted by perceived control (Courneya et al., 1997a). This finding provides further evidence that that an oncologist's recommendation to exercise can induce feelings of control and confidence to exercise in breast cancer survivors. If replicated, these findings suggest that effective oncologist interventions must target mastery and competence issues to increase exercise levels in female breast cancer survivors. Unexpectedly however, the results revealed no direct effect of intention on exercise behavior outcomes in any of the three path analyses. These results do not support previous research demonstrating intention as the proxy determinant of exercise behavior in cancer survivors (Courneya & Friedenreich, 1999; Courneya et al., 1999). One possible explanation for these findings maybe that in the present study survivors were asked their social cognitive beliefs towards exercise before the initiation of adjuvant therapy (one week post treatment consultation). Conversely, in the follow-up questionnaire survivors were asked to recall their exercise levels during treatment. Therefore, it is possible that survivors' pre-treatment exercise intentions were no longer salient during debilitating treatment modalities, subsequently intention was no longer associated with actual exercise behavior.

Furthermore, as expected the normative components of the TPB had direct effects on behavioral intention, however, the results also indicated that attitude and

perceived control also had direct effects on intention, suggesting that all three constructs may be potential targets for an intervention designed to increase exercise levels in cancer survivors. Finally, the path results also indicated that experimental condition maintained direct effects on behavioral intention even when controlling for TPB constructs. Therefore, it appears that the TPB may only partially mediate the effects of an oncologist's recommendation on behavioral intention. Of course, behavioral intention has no direct effect on actual exercise behavior, therefore this finding may be considered futile.

Effects of an Exercise Referral On Behavioral Outcomes

Another finding of the present study was that participants attending a fitness/lifestyle consultation were significantly more likely to exercise than participants in any other group. More specifically, participants attending a referral reported 134 and 297 minutes of moderate and total minutes per week compared with 63 and 107 minutes per week in all other groups combined. Moreover, 38% of participants who attended a lifestyle/fitness consultation met the ACSM guidelines compared with 16% in all other groups combined. Reports in other physician-based exercise studies are concordant in demonstrating that the most successful interventions at promoting exercise are the most intensive (i.e., physician-based counseling plus behavioral change techniques) (Harland et al., 1999; Simons-Morton et al., 2001).

Unfortunately, only 11% of participants who were assigned to the

recommendation plus referral group attended a lifestyle consultation. If only participants who reported receiving a referral are included this figure increases to 29% (this probably also explains why there were no differences between intervention groups at two or five weeks). These results are consistent with reports in other studies examining exercise referral initiatives (Damush et al., 2001; Stevens et al., 1998). Damush and colleagues (2001) demonstrated that 29% of eligible subjects attended a community-based physical activity program. Similarly, Stevens and colleagues (1998) found that 35% of middle-aged inactive patients from two general practices attended an exercise consultation with an exercise development officer.

The low percentage of participants attending an oncologist-based exercise referral is intriguing. The most compelling explanation may be that a large majority of participants did not perceive that they were referred to an exercise professional during the treatment consultation. More specifically, only 43% of participants reported that they received an exercise referral. Therefore, it is possible that the distribution of a business card was incongruent with participants' perceptions of a referral. Oncologist-based referrals to other 'on-site' psychosocial specialists (e.g., dieticians) tend to be more structured (i.e., appointment system), therefore, simply providing participants with contact information where they could obtain a free exercise consultation appears to be insufficient to be regarded as a referral. Nevertheless, despite the low attendance rates, these preliminary findings warrant

further investigations into the role of fitness/lifestyle consultations in promoting exercise in cancer survivors.

Limitations

Some of the limitations of the current study need to be addressed in future investigations. First and most importantly, the current study used self-report measures of exercise behavior at two and five weeks. Self-report measures may be biased and imprecise, therefore, differences between the groups may underestimated. Future studies should use more objective measures of physical exercise levels, such as pedometers, attendance at a fitness center, or cardio-respiratory fitness. Second, due to the concealment of the study purpose at the recruitment phase, no baseline TPB or exercise data was obtained on any participant prior to randomization. Therefore, it is possible that participants assigned to the intervention groups were previously regular exercisers and were simply maintaining their behavior. However, the randomized controlled design and large sample size should address any potential threats to the internal validity of the study. Nevertheless, it may be beneficial for future studies to obtain some baseline exercise data (e.g., in the form of a general health behavior questionnaire) while ensuring concealment of the study purpose.

Third, an important limitation of the present study is the short follow-up. To acquire the demonstrated benefits, physical exercise needs to be maintained for an extended period of time. Consequently, an oncologist recommendation must be

considered an intervention to initiate not maintain behavior change. The inclusion of a more comprehensive exercise promotion program will be necessary to maintain behavior. Future investigations should therefore determine the sustained impact of a comprehensive exercise intervention (including an oncologist's recommendation) on exercise motivation in cancer survivors. A fourth limitation of this study is the use of newly breast cancer survivors. It is recognized that breast cancer patients may represent a uniquely motivated cancer sub-population (Jones & Courneya, in press), therefore generalizations regarding the impact of oncologist-based exercise recommendations in other cancer groups can not be assumed. Another important limitation is the use of single-item scales to measure social cognitive determinants. This approach may reduce the reliability and validity of the measures, although this approach enabled further concealment of the study purpose. Nevertheless, future studies should use multiple item scales to measure TPB constructs.

Finally, results of the present study did not support the feasibility of an oncologist-based exercise referral in breast cancer survivors. As mentioned previously, the referral method in the current study has several highlighted limitations. Therefore, future studies should examine different methods to encourage cancer survivors to attend to a fitness/lifestyle consultation (e.g., oncologist schedule appointments, 'on-site' exercise counselors, reinforcement by nurse following treatment consultation).

Conclusions

Uniquely, this study is the first randomized controlled trial to attempt to increase exercise levels in newly diagnosed breast cancer survivors and to do so using an oncologist-based intervention in a concealed purpose methodology. Our intention-to-treat analyses indicated that a very brief oncologist-based recommendation during an adjuvant treatment consultation may be a feasible, but a relatively weak intervention aimed at increasing breast cancer survivor's exercise behavior, but exert strong effects on important social cognitive variables of exercise behavior. The results also suggest that a large minority of breast cancer survivors will not accurately recall information that was discussed during a treatment consultation. However, a perceived oncologist recommendation may have significant short-term effects on exercise beliefs and behavior, which appear to be sustained up to five weeks following the delivery of the intervention. Finally, the effects of an oncologist's recommendation on exercise behavior may be mediated by certain social cognitive constructs.

From a theoretical perspective, these results provide promising evidence of the efficacy of the TPB for understanding and developing effective exercise interventions. From a clinical perspective, there is now sufficient evidence to suggest that exercise can attenuate the reduction in physical functioning and quality of life associated with breast cancer and its treatment. Therefore, if replicated, these results suggest that oncologist-based exercise recommendations

supported by comprehensive exercise counseling services may play a promising role in promoting exercise in cancer survivors.

Chapter Four

General Discussion

General Discussion

The purpose of this dissertation was to first examine the role of the oncologist in promoting exercise to cancer survivors (study one) and second to determine the influence of an oncologist-based recommendation on exercise motivation in newly diagnosed breast cancer survivors using a prospective randomized controlled trial (study two).

Study one retrospectively investigated: (a) the percentage of cancer survivors who reported discussing exercise with their oncologist during a cancer consultation, (b) the effect of these discussions on normative beliefs and exercise behavior, and (c) the preferences of cancer survivors for discussing exercise with their oncologist. Results indicated that a low percentage of oncologist's initiated discussions on exercise during treatment consultations and up to a third of exercise discussions were initiated by cancer survivors themselves. Importantly, the results also suggested that cancer survivors who reported that their oncologist discussed exercise during their consultation reported more exercise during adjuvant treatment compared to survivors who reported that exercise was not discussed. Finally, an overwhelming majority of cancer respondents reported that they would prefer their oncologist to initiate a discussion on exercise during treatment consultations and a lesser majority would also prefer to be referred to a specialist to receive additional counseling on exercise. These findings suggest that cancer survivors are very interested in receiving exercise counseling from their

oncologist during a treatment consultation and receiving such advice can result in increased levels of physical exercise. The results were discussed in terms of the potential role of the oncologist in promoting exercise in cancer survivors, theoretical implications, and directions for future research.

Based on this rationale, using a randomized controlled design study two investigated the effects of an oncologist-based recommendation on exercise motivation in cancer survivors. Specifically, the effects of two interventions were compared with conventional standard of treatment and with each other on self-reported Theory of Planned Behavior and exercise behavior. The feasibility of a fitness/lifestyle intervention was also explored in this study. Uniquely, this is the first study to attempt to improve exercise levels in cancer survivors and to do so using a randomized controlled trial.

Preplanned analyses revealed minimal effects on behavioral outcomes. However, a large minority of participants may inaccurately perceive information provided during the treatment consultation. Ancillary analyses indicated that perceiving an oncologist-based recommendation may have an even stronger impact on breast cancer survivor's exercise beliefs and behavior. Furthermore, in certain circumstances exercise behavior was mediated by key social cognitive constructs. Results also provided preliminary evidence that an individualized fitness/lifestyle consultation may be a feasible and effective method to increase exercise behavior in newly diagnosed breast cancer survivors. Results of this

study were discussed in terms of the future clinical practice implications for cancer care, theory-based interventions, and physician-based exercise counseling interventions.

Retrospective preliminary evidence from study one and experimental evidence from study two confirmed that oncologist-based interventions may be a promising intervention to increase exercise levels in breast cancer survivors. It also appears that breast cancer survivors are very interested in receiving and are motivated to comply with such advice during adjuvant therapy. Uniquely, the results of this dissertation confirm the efficacy of the TPB as a strong theoretical model to guide the development of effective exercise interventions. Moreover, the use of behavioral theory also provided information to understand and evaluate how and why the intervention was effective. These findings underscore the importance of using behavioral theory when designing and implementing behavior change interventions (Ajzen, 2002a; Fishbein, 2001; Fishbein et al., 2001).

The retrospective methodology in study one, the short-term follow-up in study two, and the use of self-report measures in both studies limit the applied practice implications of oncologist-based exercise interventions that need to be addressed in future studies. Overall however, the findings of this dissertation suggest that the oncologist may play a promising role in promoting exercise to cancer survivors. If replicated, oncologist-based recommendations may play a central role in any intervention designed to promote exercise rehabilitation in

cancer survivors.

Future Directions

Apart from addressing the aforementioned limitations in future research endeavors, it is also important to provide overall future directions that may advance the field of physician-based/oncologist-based exercise interventions. First, numerous reports have provided consistent evidence that physician-based counseling can produce significant short-term effects in exercise behavior of previously sedentary individuals. Nevertheless, national data still indicates that a low percentage of physicians and health-care providers provide exercise advice during medical consultations. Therefore, physicians and healthcare providers should expected to recommend rather than counsel or prescribe physical exercise. Such expectations may address several frequently cited barriers and increase the prevalence of exercise advice during medical consultations.

Second, future studies should examine the overall medical consultation experience with a view to addressing how exercise messages delivered during this 'teachable moment' can be more effective at changing exercise behavior. Specifically, future studies should examine interactions between: (1) the timing of the recommendation (are individuals more receptive at the start or the end of the consultation), (2) the frame of the recommendation (should messages be provided in a positive or negative frame), (3) the type of recipient (male versus female; old versus young; educated versus non-educated; stage of exercise readiness;

personality, etc.), (4) channel of message delivery (written versus verbal versus a combined approach) and (4) content of the exercise message (affective or instrumental attitudinal based message versus a perceived control message).

Finally, acknowledging the previous point and the fact that a brief recommendation may not have sustainable effects on exercise behavior, it may be beneficial for medical practices to forge collaborative initiatives with exercise promotion specialists, either via 'on-site' exercise consultants or through increased access to community-based lifestyle and health facilities. Such specialists could deliver more intensive exercise counseling sessions that may increase the likelihood of prolonged health and exercise behavior change.

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APPENDIX A: EMPIRICAL STUDIES OF PATIENT EXPECTATIONS AND ATTITUDES TOWARDS PHYSICAL EXERCISE COUNSELING

Authors	Sample	Design	Measure	Results
Cancer Population				
(Cooper 95)	75 breast cancer survivors	Cross-sectional	1 item: "to what extent was physical activity discussed by your physician/nurse in relationship to your recovery process"	70% of respondents reported that they received none or little information from their physician regarding physical activity. Those who received information tended to return to physical activity more quickly.
(Leddy 97)	11 Stage I & 64 Stage II breast cancer survivors	Retrospective	1 item: "my physician is very supportive and encourages me to exercise"	Participants perceived limited support for exercise from medical and nursing staff.
(Courneya & Friedenreich 97)	110 Colorectal cancer survivors	Cross-sectional	1 item: "How strongly would your physician have approved or disapproved of you exercising regularly during your cancer treatment?"	Physician measure did not significantly correlate with subjective norm, intention, or behavior.
(Segar et al., 98)	24 breast cancer survivors recruited through university support groups & mail surveys	Prospective	Instrument not listed	Only 50% of participants received a physician recommendation to exercise. Those receiving recommendation reported greater exercise compliance.

Authors	Sample	Design	Measure	Results
Cancer Population				
(Courneya & Friedenreich, 99)	164 women diagnosed with breast cancer	Retrospective	1 item: "how strongly would your physician have approved or disapproved of you exercising regularly during treatment?"	Physician approval correlated positively with subjective norm, intention, & behavior (r=.35;.20;.28 respectively).
(Demark-Wahnefried et al. 00)	978 breast and prostate cancer survivors	Cross-sectional	1 item: "during your cancer care, did your physician recommend exercise?"	33% of participants reported that their physician recommended exercise during this time.
(Courneya et al., 01)	24 breast cancer survivors posttreatment	Prospective	1 item: How much support would your physician give you if you tried to exercise twice per week over the next 12 weeks?"	Physician beliefs was significantly correlated with subjective norm and exercise behavior.
Healthy Population				
(Godin & Shephard, 90)	799 subjects drawn from independent populations	Cross-sectional	Investigator developed questionnaire, based on the Theory of Planned Behavior	Healthy adults thought their physician wanted them to exercise and were motivated to comply with such advice.
(Price et al., 91)	382 patients attending midwestern residency program	Cross-sectional	34-item investigator developed questionnaire based on a review on physicians professional practices	2% thought physicians should not be involved exercise counseling, 11% thought they should be referred to a specialist, 36% thought physicians should assist those patients who ask, 51% thought they should counsel all who need it.
(Lewis & Lynch, 93)	383 patients attending a university hospital	Cross-sectional	1 item: "if my doctor advised to exercise, I would follow his/her advice?"	35% strongly agreed & 58% agreed with following the physicians' advice to exercise

Authors	Sample	Design	Measure	Results
Healthy Population				
(Kravitz et al., 94)	304 patients attending an internal practice in the U.S.	Retrospective	1 item: "how strongly would your physician have approved or disapproved of you exercising regularly during treatment?"	Physician approval correlated positively with subjective norm, intention, & behavior (r=.35;.20;.28 respectively).
(Friedman et al., 94)	1,246 sedentary persons who had a routine checkup	Cross-sectional	Investigator developed questionnaire	Only 15% reported being told by their physicians to exercise more.
(Weingarten et al., 95)	2,799 adult patients attending a HMO in the U.S.	Cross-sectional	Preventive care services survey, quality of life, patient satisfaction survey	Patients who received exercise counselling were significantly more satisfied with their medical care then those patients who did not.
(Calfas et al., 96)	107 interviewed 2 t0 4 weeks after PACE counseling	Cross-sectional	Investigator-developed questionnaire	72% of patients reported that they found counselling to be 'somewhat' to 'very helpful'.
(Wee et al., 99)	9299 respondents to the National Health Interview survey	Retrospective	1 item: "During your last medical check-up did the doctor recommend that you begin or continue to do any type of exercise or physical activity?"	34% of participants reported being counselled about exercise at their last medical visit. Women, older patients, overweight, and higher income patients were more likely to be counselled.
(Glasgow et al., 01)	A diverse sample of 1818 U.S. adults	Cross-sectional	Investigator-developed questionnaire	Only 28% of respondents reported receiving physician advice to increase their physical activity level. Older, nonwhite, and chronically ill patients were more likely to receive counselling.

APPENDIX B: EMPIRICAL STUDIES OF PHYSICIAN-BASED PHYSICAL ACTIVITY COUNSELING TRIALS

Authors	Sample	Design	Exercise Program	Outcome Variables	Results
(Reid & Morgan, 79)	124 volunteer firefighters randomly assigned to 3 conditions	Experimental	10 minutes consultation making suggestions for the correct exercise prescription	Submaximal bike ergometer test	At 3 months, compliance higher in the treatment groups
(Kelly, 88)	18 GP's recruited 422 patients	Experimental	Educational pamphlet, healthy choices program, individualized prescription	Interviews at 4 weeks on behavioral outcomes	27% made some exercise changes, only 10% made changes who were not motivated
(Logsdon et al., 89)	2,218 adult respondents from 5 medical practices	Quasi-experimental	15 minutes of advice on lifestyle behaviors including physical activity	Investigator-developed questionnaire at 12 months	Significant changes occurred btw control and experimental groups on starting an exercise program
(Lewis & Lynch, 93)	383 patients attending a university hospital	Experimental	2 to 3 minutes of advice, a handout, & 1 month follow-up phone call	Exercise habit and attitude survey	Those patients receiving advice significantly increased exercise duration
(Graham-Clarke & Oldenburg, 94)	80 GP's recruited 758 patients	Experimental	Routine care; counseling + video; counseling + video + self-help	Risk factor prevention survey report on freq/dur activity & intention (4 & 12 months	No significant differences between any groups

Authors	Sample	Design	Exercise Program	Outcome Variables	Results
(Cupples & McKnight, 95)	688 angina patients, >75 yrs from 18 General Practices	Experimental	Physical advice by a health visitor regarding CV risk factors	Two year review. Investigator developed questionnaire	44% reported taking daily physical activity compared with 24% in the control group
(Burton et al., 95)	4,195 medicare patients recruited from primary care practices	Experimental	2 risk factor prevention visits 1 year apart	Self-report of exercise behavior	No difference between groups
(Calfas et al., 96)	17 GP's recruited 255 sedentary patients	Quasi-experimental	3-5 minutes of exercise advice based on the TTM	College Alumni Survey & 7 day recall, accelerometers	Intervention patients reported increased walking & exercise readiness
(Marcus et al., 97)	Convenience sample of 4 GP's recruited 44 patients	Experimental	Individualized exercise prescription, based on social cognitive theory	PASE & stage of adoption questionnaire	No significant differences between groups on PASE scores at 6 weeks
(Swinburn et al., 98)	37 GP's enrolled 491 patients who were likely to benefit from exercise counseling	Experimental	Written vs. verbal exercise advice on moderate activity. 5 minutes of counseling	Investigator-developed questionnaire, assessed time spent in physical activity over previous 2 weeks	Intervention patients were exercising more at follow-up
(Stevens et al., 98)	GP's recruited 714 sedentary subjects & consultations with exercise officer	Experimental	Individualized 10 week exercise program	Investigator-developed questionnaire at 10 weeks and 8 months	

Authors	Sample	Design	Exercise Program	Outcome Variables	Results
(Bull et al., 98)	10 FP's recruited 763 sedentary patients	Experimental	Verbal & written advice, & tailored intervention (computer-assisted)	Risk Factor Prevention Survey and investigator developed measure. Assessed at 1, 6, & 12 months	More patients in the intervention groups were 'now active' compared with the control group
(Harland et al., 99)	523 adults aged 40 to 64 yrs from an urban practice	Experimental	Motivational interviews & incentives based on social cognitive theory	Self-reported exercise from national fitness survey at 12 weeks & 12 months	Intervention subjects reported increased physical activity levels
(Goldstein et al., 99)	34 matched physicians enrolled 355 patients	Experimental	Individualized exercise, based on the TTM. Physician training/patient manual, 5 minutes of counseling	6 weeks & 8 months, stage of readiness, PASE, QOL, POC, SE	At follow-up intervention groups moved to more advanced stages than control group
(King et al., 01)	874 adults recruited from 3 clinical centers	Experimental	Randomized to 1 of 3 conditions: (a) standard care; (b) staff assisted; (c) counseling	Energy expenditure, V02 max, cost-effectiveness, adherence	V02 max significantly higher for women at 24 months, no differences between intervention groups. Men no differences
(Damush et al., 01)	500 older female patients recruited from inner city primary care	Experimental	Physician screen, referral to a submaximal exercise test and exercise program	Class attendance, physical activity level, social cognitions	29% completed the exercise test, 28% attended at least one exercise session

APPENDIX C: STUDY ONE CONSENT FORM AND NOTICE OF RESEARCH STUDY

Examining the Role of the Oncologist in Promoting Health Behavior in the Cancer Consultation.

CONSENT FORM

This consent form is part of the process of informed consent. It is designed to give you an idea of what this research study is about and what will happen to you if you choose to be in the study.

If you would like to know more about something mentioned in this form, or have any questions regarding this research study, please be sure to ask your doctor or nurse. Read this form carefully to make sure you understand all the information it provides. You will get a copy of this form to keep.

This study may not help you directly, but we hope that it will teach us something that will help others in the future.

BACKGROUND INFORMATION

During a cancer consultation, oncologists discuss a variety of issues related to your cancer diagnosis and your treatment rehabilitation process. However, many oncologists do not counsel cancer patients about psychosocial and behavioral issues such as nutrition or exercise advice.

STUDY PURPOSE

The purpose of this study will be to examine your preferences of the oncologist in discussing psychosocial and behavioral issues in the cancer consultation.

STUDY DESIGN

You will be asked to complete a self-administered questionnaire investigating your preferences in discussing psychosocial and behavioral issues with a particular focus on physical exercise counseling in the cancer consultation. The questionnaire will take approximately 20-30 minutes to complete. If any question asks for information that you are not comfortable in providing, you are not required to do so, just leave it blank and move on to the next question.

RISK and BENEFITS OF STUDY PARTICIPATION

Some possible risk is involved if you choose to participate in this study. We will be

asking you to recall your cancer experience, which for some may be traumatic. If this is problematic for you, you need not participate. If you would like someone to speak to about your cancer experience, you may contact the Department of Psychology at the Cross Cancer Institute (780) 432-8703, or the Department of Psychosocial Resources at the Tom Baker Cancer Centre (403) 670-1767. Also, it is not expected that there will be any personal benefit to you. However, your participation may help improve patient care in the long term.

CONFIDENTIALITY

The information that we collect as part of this study will be shared with other researchers and doctors. However, you will not be identified in any of these reports. We will keep all the material we collect for this study in a safe storage area.

UNDERSTANDING OF PARTICIPANTS

I am signing this form to show that I have read the consent form, and that I agree to take part in the study as a subject. In no way does this waive my legal rights nor release the investigators, sponsors, or involved institutions from their legal and professional responsibilities. I am free to withdraw from this study at any time without jeopardizing my health care. If I continue to take part in this study, I am to be kept as informed as my initial consent. If I have further questions concerning this research study, I may call the research coordinator:

Dr. Kerry Courneya, University of Alberta: (780) 492-2892
Lee Jones, PhD (c), University of Alberta: (780) 492-2829

If I have any questions concerning my rights as a possible participant in this research, I can call the Patient Advocate at (780) 432-8585. I will get to keep a copy of this consent for information and for future reference.

_____	_____	_____
Name of Patient	Signature of Patient	Date & Time
_____	_____	
Name of Witness	Signature of Witness	
_____	_____	
Name of Investigator	Signature of Investigator	
_____		
Date		

Notice of Research Study

My name is Dr. Kerry Courneya and I am a Professor in the Department of Oncology and the Faculty of Physical Education at the University of Alberta. I am also a member of the Scientific Staff of the Cross Cancer Institute (Edmonton). As part of my responsibilities, I conduct research in the area of cancer and cancer rehabilitation. I have contacted you because you are eligible to participate in one of my current projects on the role of the oncologist in promoting health behavior in cancer consultations.

My co-investigator on the project is Mr. Lee Jones who is one of my current graduate students. The study has been reviewed by the Alberta Cancer Board's Research Ethics Committee and has met the rigorous requirements for ethical approval. Please be assured that your name and any personal information has not and will not be released to anyone other than myself and Mr. Jones and we will hold this information in strict confidence.

In our previous research we have found that during a cancer consultation oncologists consult patients regarding a variety of treatment and rehabilitation issues. In this study, we are trying to examine your preferences of the oncologist in discussing psychosocial and behavioral issues in the cancer consultation. This information will be very helpful to us in designing specific motivational/informational materials for cancer survivors interested in changing certain lifestyle factors. We hope that you will help us out by participating in the study

What do I have to do to participate?

It is actually quite simple. All we ask is that you complete the enclosed questionnaire and return it to us at your earliest convenience. That's it! This questionnaire should take less than 25 minutes of your time. **You may refuse to answer any questions in the questionnaire.** We have provided a self-addressed, stamped envelope for your convenience and instructions are provided on the front of the questionnaire.

But I don't exercise and so I won't be of any help!

Yes you will! It is only by understanding the issues of **both** exercisers and non-exercisers that we can hope to gain a fuller understanding of all that is involved in the decision of whether or not to exercise during or following cancer treatment.

Do I have to participate?

Absolutely not! **Your participation is completely voluntary.** If you choose not to participate please disregard this, or any future information you may receive about our study. However, it is only through voluntary participation in research projects that we increase our knowledge about issues that are important to cancer survivors. We hope you can find the time to help us out. If you have any questions about the study or about completing the questionnaire, please feel free to call Lee Jones collect at home, at the office or on his e-mail. Thank-you in advance for considering participation in our study.

Sincerely,

Lee Jones, Ph.D. (C)
Tel: (780) 492 - 2829, E-mail: lwjones@ualberta.ca

APPENDIX D: STUDY ONE QUESTIONNAIRE

Cancer Consultation Questionnaire

Kerry S. Courneya, Ph.D and
Lee W. Jones, Ph.D (c)

University of Alberta

Instructions

In this questionnaire we are going to ask you a series of questions regarding your visit(s) with your oncologist. The visits we are talking about are the ones in which you and your oncologist discussed your medical treatment issues such as what treatments you should have, how the treatments are progressing, and any follow-up treatments. Our interest in this questionnaire is whether any psychosocial or behavioral issues were discussed in addition to medical issues, and also your thoughts about whether such issues should be discussed. There are no right or wrong answers and all we ask is that you provide responses that are as honest and accurate as possible. The questionnaire should take between 10-15 minutes to complete. It is important to answer all questions so that we can include your responses in our analyses. If you have any questions please contact Lee Jones at (780) 492-2829 (8.00am-7.00pm) or (780) 434-9386 (after 8.30pm). Please call collect if calling from out of town. Once again, many thanks for your participation.

***After completing your questionnaire, please place it back in the stamped addressed envelope provided and please mail it back at your earliest convenience. Thanks!**

This first set of questions ask about what psychosocial and behavioral issues were discussed by your oncologist during your medical consultations. For each of the issues listed please indicate your responses by placing a checkmark in the appropriate box.

1. Which of the following issues <u>were discussed</u> during your consultations with your oncologist (please indicate a response for part A **<u>AND</u>**, if appropriate part B)?

	PART A			PART B	
Issues	Discussion initiated by oncologist	Discussion initiated by YOU	Not discussed	If the issue was discussed were you referred to a specialist	
a. Psychological issues (e.g. anxiety)	☐	☐	☐	YES	NO
b. Social issues (i.e., family issues)	☐	☐	☐	YES	NO
c. Smoking status	☐	☐	☐	YES	NO
d. Nutritional advice	☐	☐	☐	YES	NO
e. Weight control	☐	☐	☐	YES	NO
f. Exercise	☐	☐	☐	YES	NO
g. Alcohol intake	☐	☐	☐	YES	NO
h. Spiritual issues	☐	☐	☐	YES	NO
i. Sexuality issues	☐	☐	☐	YES	NO

2. Which of the following issues would you have liked to have been discussed during your consultation with your oncologist (please indicate a response for part A **AND**, if appropriate part B)?

	PART A			PART B	
Issues	Should be initiated by oncologist	Should be initiated only by YOU	Should not be discussed	If discussed, should the oncologist refer you to a specialist	
a. Psychological issues (i.e., anxiety)	☐	☐	☐	YES	NO
b. Social issues (i.e., family issues)	☐	☐	☐	YES	NO
c. Smoking status	☐	☐	☐	YES	NO
d. Nutritional advice	☐	☐	☐	YES	NO
e. Weight control	☐	☐	☐	YES	NO
f. Exercise	☐	☐	☐	YES	NO
g. Alcohol intake	☐	☐	☐	YES	NO
h. Spiritual issues	☐	☐	☐	YES	NO
i. Sexuality issues	☐	☐	☐	YES	NO

This next set of questions ask you to focus specifically on physical exercise. We define exercise as any physical activity done on a regular basis (at least 3 times per week, for 20 or more minutes, at moderate intensity) with the intention of improving physical fitness and health (e.g., brisk walking, running, weight training, bicycling, swimming, etc).

3. Would you prefer to be counseled about exercise at some point during the cancer experience (not necessarily by the oncologist, but by someone)?

YES NO MAYBE

***Even if you responded NO to the above question, please answer the following questions.**

4. If you <u>were</u> to receive exercise counseling, who would you prefer it from (check one only)?

_____ oncologist _____ nurse _____ exercise specialist affiliated with the cancer center _____ exercise specialist affiliated with the community (e.g., YMCA) _____ a cancer patient/survivor

5. If you <u>were</u> to receive exercise counseling, when would you prefer it (check one only)?

1	2	3	4	5
Before Treatment	During Treatment	Immediately Following Treatment	3-6 months after Treatment	At Least 1 year after Treatment

6. If you <u>were</u> to receive exercise counseling, where would you prefer it take place (check one only)?

___ at the cancer center ____ at a community fitness center

_____ at my home

7. If you <u>were</u> to begin an exercise program, when would you prefer to start it (check one only)?

1	2	3	4	5
Before Treatment	During Treatment	Immediately Following Treatment	3-6 months after Treatment	At Least 1 year after Treatment

8. If you <u>were</u> to receive exercise counseling, how would you prefer to receive it? Please rank your top three choices (i.e., 1,2,3).

_____ face to face _____ by telephone _____ on videotape _____ on audiotape_____ in a pamphlet/brochure _____ over the internet

The next set of questions ask you specifically about how you would feel about receiving exercise counseling from your <u>oncologist during your cancer consultation</u> where your treatment protocol is discussed. Please indicate the number that best represents your thoughts.

9. I think receiving exercise counseling from my oncologist during my medical consultation would be:

1	2	3	4	5	6	7
Extremely Useful	Quite Useful	Slightly Useful		Slightly Useless	Quite Useless	Extremely Useless
1	2	3	4	5	6	7
Extremely Engaging	Quite Engaging	Slightly Engaging		Slightly Distracting	Quite Distracting	Extremely Distracting
1	2	3	4	5	6	7
Extremely Important	Quite Important	Slightly Important		Slightly Unimportant	Quite Unimportant	Extremely Unimportant
1	2	3	4	5	6	7
Extremely Good	Quite Good	Slightly Good		Slightly Bad	Quite Bad	Extremely Bad

10. It is clear to me that my oncologist thought I should have participated in regular physical exercise during my cancer treatment.

1	2	3	4	5	6	7
Strongly Disagree	Moderately Disagree	Slightly Disagree		Slightly Agree	Moderately Agree	Strongly Agree

11. I think my oncologist would have approved of me exercising regularly during my cancer treatment.

1	2	3	4	5	6	7
Strongly Disagree	Moderately Disagree	Slightly Disagree		Slightly Agree	Moderately Agree	Strongly Agree

12. My oncologist encouraged me to exercise regularly during my cancer treatment.

1	2	3	4	5	6	7
Strongly Disagree	Moderately Disagree	Slightly Disagree		Slightly Agree	Moderately Agree	Strongly Agree

13. Receiving exercise counseling from my oncologist did/would have influenced my decision to exercise regularly during my treatment.

1	2	3	4	5	6	7
Strongly Disagree	Moderately Disagree	Slightly Disagree		Slightly Agree	Moderately Agree	Strongly Agree

14. If I had received exercise counseling from my oncologist, I would have followed his/her advice.

1	2	3	4	5	6	7
Extremely Unlikely	Quite Unlikely	Slightly Unlikely		Slightly Likely	Quite Likely	Extremely Likely

15. Receiving exercise counseling from my oncologist would have increased the likelihood of my exercise regularly during my treatment.

1	2	3	4	5	6	7
Strongly Disagree	Moderately Disagree	Slightly Disagree		Slightly Agree	Moderately Agree	Strongly Agree

16. For this next question, we would like you to recall your average weekly exercise during **your cancer treatment**. How many times per week on average did you do the following kinds of exercise during your treatment.

When answering these questions please:

- consider your average weekly exercise during your cancer treatment.
- only count exercise that was done during your free time (i.e., not occupation or housework).
- note that the main difference between the three categories is the intensity of the exercise.
- please write the average frequency on the first line and the average duration on the second line.

	Times Per Week	Average Duration
a. STRENUOUS EXERCISE (HEART BEATS RAPIDLY, SWEATING)	_____	_____
(e.g., running, jogging, hockey, soccer, squash, cross country skiing, vigorous swimming, heavy weight training, etc.)		
b. MODERATE EXERCISE EXHAUSTING, LIGHT PERSPIRATION)	_____	_____
(e.g., similar to above but at a moderate intensity)		
c. MILD EXERCISE	_____	_____
(e.g., easy walking, yoga, bowling)		

17. The following questions ask about your preferences for exercise activities during your cancer treatment. Check only one response for each question unless otherwise indicated. Be sure to answer the questions based on what you PREFER to do and not necessarily what you ACTUALLY do.

During my cancer treatment:

I prefer / would have preferred to have exercised:

a. alone___ with 1 or 2 other cancer patients_____

with 1 or 2 non-cancer patients_____in a group of cancer patients____ in a

group of non-cancer patients_____ no preference_____

b. at home_____ at a community fitness center_____ outdoors____

at a fitness center located at a cancer institute____no preference_____

c. morning_____ afternoon___ evening_____no preference ____

d. My preferred exercise activity is (check one only):

walking___ dancing_____ swimming___ bicycling_____

skating_____ jogging_____ weight training_____skiing____

I prefer / would have preferred my exercise to be (please respond to all sections):

e. low intensity___ moderate intensity_____ high intensity____
no preference____

f. the same activity each time__ or different activities each time_____

g. supervised/instructed____ or unsupervised/self-paced__

h. competitive___ or recreational_____

i. spontaneous/flexible____ or scheduled (specific days/times)___

This part of the questionnaire is needed to help understand the characteristics and medical backgrounds of the people participating in the study. For this reason it is very important information. All the information is held in strict confidence and its presentation to the public will be group data only. Also you may not know the answers to some of the medical questions. If you don't just circle "don't know" (DK). Please answer the questions to the best of your knowledge.

1. Age:_____

2. Sex: Male ☐ Female ☐

3. Marital Status: Never Married ___ Married ___ Common Law____

Separated ___ Widowed ___ Divorced ___

4. Education (Please indicate the highest level attained):

Some High School ___ Completed High School ___

Some University/College ___ Completed University/College ___

Some Graduate School ___ Completed Graduate School ___

5. Annual Family Income:

<20,000____ 2—39,999___ 40-59,999___

60-79,999___ 80-99,999___ >100,000___

6. Employment Status:

Homemaker ___ Retired ___ Part Time___

Full Time ___ Temporarily unemployed ____

7. Height and Weight Information:

Weight in pounds_____ or kilograms _____.

Height in feet/inches _____ or meters/cent _____ .

8. What type of cancer were you diagnosed with (e.g., breast)? _____DK

9. When were you diagnosed with cancer (month/year)? _____DK

10. What was the stage of your cancer at diagnosis (i.e., I, II, III)_____DK

11. Did/will your treatment include surgery (please circle)? Yes No

a. If yes, what kind of surgery did/will you have (month/year)? _____DK

b. If yes, what was/will be the date of the surgery (month/year)?_____DK

12. Did/will your treatment include chemotherapy (please circle)? Yes No

a. If yes, when did/will it begin (month/year)? _____DK

b. If yes, when did /will it end (month/year)? _____DK

13. Did/will your treatment include radiation therapy (please circle)?Yes No

a. If yes, when did/will it begin (month/year)? _____DK

b. If yes, when did /will it end (month/year)? _____DK

14. Anything else about your cancer diagnosis that we have missed? Please add here.

_____

_____

_____

_____

On this final page, please feel free to make any written comments concerning this study or the potential role of health behavior counseling following cancer diagnosis.

Thank you very much for your participation in this research project. Please place the completed questionnaire in the envelope provided for you.

APPENDIX E: GROUP ASSIGNMENT SHEET FOR RECOMMENDATION ONLY GROUP

When Appropriate During the Consultation

(Condition A)

Recent research has shown that some of the side effects you may experience during treatment may be controlled with a modest exercise program.

I recommend trying to exercise 20-30 minutes everyday at a moderate intensity. Even less than this may be beneficial, but try to do something everyday.

Exercises such as a brisk walking program will meet these requirements.

Was condition delivered successfully? Yes No

If no, why?

_____

_____

APPENDIX F: GROUP ASSIGNMENT SHEET FOR RECOMMENDATION PLUS REFERRAL GROUP

When Appropriate During the Consultation

(Condition B)

Recent research has shown that some of the side effects you may experience during treatment may be controlled with a modest exercise program.

I recommend trying to exercise 20-30 minutes everyday at a moderate intensity. Even less than this may be beneficial, but try to do something everyday.

Exercises such as a brisk walking program will meet these requirements.

In fact, here is a business card where you can obtain a ***free*** fitness consultation and obtain further information regarding the benefits of exercise for cancer patients.

Was condition delivered successfully? Yes No

If no, why

_____

_____

APPENDIX F: GROUP ASSIGNMENT SHEET FOR RECOMMENDATION PLUS REFERRAL GROUP (REFERRAL CARD)

UNIVERSITY OF ALBERTA

Lee W. Jones, M.Sc.
Fitness Consultant
Faculty of Physical Education and Recreation
E401 Van Vliet Centre
Edmonton, Alberta
Canada T6G 2H9
Telephone: (780) 492-2829
Fax: (780) 492-2364
E-mail: lwjones@ualberta.ca

APPENDIX H: STUDY TWO QUESTIONNAIRE

Patient-Oncologist Communication Survey

Kerry S. Courneya, Ph.D

University of Alberta and Cross Cancer Institute

Instructions

In this questionnaire we are going to ask you a series of questions regarding your consultation with your oncologist. There are no right or wrong answers and all we ask is that you provide responses that are as honest and accurate as possible. The questionnaire should take between 20-25 minutes to complete. If there are any questions that you feel you cannot or do not want to answer, just leave them blank. If you have any questions please feel free to call Kerry Courneya collect at the office (492-1031) or on his e-mail (kerry.courneya@ualberta.ca). Once again, thank you for your participation. Your oncologist will not have access to your responses, they are completely confidential.

***After completing your questionnaire, please place it in the stamp addressed envelope and mail it back at your earliest convenience. Thank-you!**

This first set of questions ask about what psychosocial and behavioral issues were discussed by your oncologist during your medical consultations. For each of the issues listed please indicate your responses by placing a checkmark in the appropriate box.

1. Which of the following issues <u>were discussed</u> during your consultations with your oncologist (please indicate a response for part A and **<u>if appropriate</u>** part B)?

	<u>PART A</u>			**<u>PART B</u>**	
	Discussion initiated by oncologist	Discussion initiated by YOU	Not discussed	If the issue was discussed were you referred to a specialist?	
a.Psychological issues (e.g. anxiety)	☐	☐	☐	YES	NO
b. Social issues (e.g., family issues)	☐	☐	☐	YES	NO
c. Smoking status	☐	☐	☐	YES	NO
d. Nutritional advice	☐	☐	☐	YES	NO
e. Weight control	☐	☐	☐	YES	NO
f. Exercise	☐	☐	☐	YES	NO
g. Alcohol intake	☐	☐	☐	YES	NO
h. Spiritual issues	☐	☐	☐	YES	NO
i. Sexuality issues	☐	☐	☐	YES	NO

Please rate the extent to which you believe your oncologist would approve or disapprove of you trying each of the following psychosocial and behavioral activities over the next month. Please use the following scale to guide your responses and circle the number that most accurately reflects your beliefs.

1	2	3	4	5	6	7
Strongly Disapprove	Moderately Disapprove	Slightly Disapprove	Neither Approve or Disapprove	Slightly Approve	Moderately Approve	Strongly Approve

How strongly would your oncologist approve or disapprove of you trying each of the following psychosocial and behavioral activities over the next month.

(a) attending psychological counseling	1	2	3	4	5	6	7
(b) attending social work counseling	1	2	3	4	5	6	7
(c) quitting/reducing smoking	1	2	3	4	5	6	7
(d) improving your diet	1	2	3	4	5	6	7
(e) exercising regularly	1	2	3	4	5	6	7
(f) controlling your weight	1	2	3	4	5	6	7
(g) reducing your alcohol intake	1	2	3	4	5	6	7
(h) attending pastoral counseling	1	2	3	4	5	6	7
(i) attending sexuality counseling	1	2	3	4	5	6	7

Please rate the extent to which you agree or disagree with the statement provided below. Please use the following scale to guide your responses and circle the number that most accurately reflects your beliefs.

1	2	3	4	5	6	7
Strongly Disagree	Moderately Disagree	Slightly Disagree	Neither Agree or Disagree	Slightly Agree	Moderately Agree	Strongly Agree

Over the next month, if my oncologist advised me, I would....

(a) attend psychological counseling	1	2	3	4	5	6	7
(b) attend social work counseling	1	2	3	4	5	6	7
(c) quit/reduce smoking	1	2	3	4	5	6	7
(d) improve my diet	1	2	3	4	5	6	7
(e) exercise regularly	1	2	3	4	5	6	7
(f) control my weight	1	2	3	4	5	6	7
(g) reduce my alcohol intake	1	2	3	4	5	6	7
(h) attend pastoral counseling	1	2	3	4	5	6	7
(i) attend sexuality counseling	1	2	3	4	5	6	7

Please rate how easy or difficult it would be for you to do each of the following psychosocial and behavioral activities over the next month. Please use the following scale to guide your responses and circle the number that most accurately reflects your beliefs.

1	2	3	4	5	6	7
Extremely Easy			Moderately Easy/Difficult			Extremely Difficult

How easy or difficult would it be for you to...

(a) attend psychological counseling	1	2	3	4	5	6	7
(b) attend social work counseling	1	2	3	4	5	6	7
(c) quit/reduced smoking	1	2	3	4	5	6	7
(d) improve your diet	1	2	3	4	5	6	7
(e) exercise regularly	1	2	3	4	5	6	7
(f) control your weight	1	2	3	4	5	6	7
(g) reduce your alcohol intake	1	2	3	4	5	6	7
(h) attend pastoral counseling	1	2	3	4	5	6	7
(i) attend sexuality counseling	1	2	3	4	5	6	7

The following questions ask you to rate how you feel about doing certain Psychosocial and behavioral activities over the next month.

1. For me, attending psychological counseling would be:

1	2	3	4	5	6	7
Extremely Useful	Quite Useful	Slightly Useful	Neither Useful or Useless	Slightly Useless	Quite Useless	Extremely Useless

1	2	3	4	5	6	7
Extremely Important	Quite Important	Slightly Important	Neither Important or Unimportant	Slightly Unimportant	Quite Unimportant	Extremely Unimportant

2. For me, attending social work counseling would be:

1	2	3	4	5	6	7
Extremely Useful	Quite Useful	Slightly Useful	Neither Important or Unimportant	Slightly Useless	Quite Useless	Extremely Useless

1	2	3	4	5	6	7
Extremely Important	Quite Important	Slightly Important	Neither Important or Unimportant	Slightly Unimportant	Quite Unimportant	Extremely Unimportant

3. For me, quitting/reducing smoking would be (if applicable):

1	2	3	4	5	6	7
Extremely Useful	Quite Useful	Slightly Useful	Neither Important or Unimportant	Slightly Useless	Quite Useless	Extremely Useless

1	2	3	4	5	6	7
Extremely Important	Quite Important	Slightly Important	Neither Important or Unimportant	Slightly Unimportant	Quite Unimportant	Extremely Unimportant

4. For me, <u>improving my diet</u> would be:

1	2	3	4	5	6	7
Extremely Useful	Quite Useful	Slightly Useful	Neither Important or Unimportant	Slightly Useless	Quite Useless	Extremely Useless

1	2	3	4	5	6	7
Extremely Important	Quite Important	Slightly Important	Neither Important or Unimportant	Slightly Unimportant	Quite Unimportant	Extremely Unimportant

5. For me, <u>controlling my weight</u> would be:

1	2	3	4	5	6	7
Extremely Useful	Quite Useful	Slightly Useful	Neither Important or Unimportant	Slightly Useless	Quite Useless	Extremely Useless

1	2	3	4	5	6	7
Extremely Important	Quite Important	Slightly Important	Neither Important or Unimportant	Slightly Unimportant	Quite Unimportant	Extremely Unimportant

6. For me, <u>exercising regularly</u> would be:

1	2	3	4	5	6	7
Extremely Useful	Quite Useful	Slightly Useful	Neither Important or Unimportant	Slightly Useless	Quite Useless	Extremely Useless

1	2	3	4	5	6	7
Extremely Important	Quite Important	Slightly Important	Neither Important or Unimportant	Slightly Unimportant	Quite Unimportant	Extremely Unimportant

7. For me, reducing my alcohol intake would be:

1	2	3	4	5	6	7
Extremely Useful	Quite Useful	Slightly Useful	Neither Important or Unimportant	Slightly Useless	Quite Useless	Extremely Useless

1	2	3	4	5	6	7
Extremely Important	Quite Important	Slightly Important	Neither Important or Unimportant	Slightly Unimportant	Quite Unimportant	Extremely Unimportant

8. For me, attending pastoral counseling would be:

1	2	3	4	5	6	7
Extremely Useful	Quite Useful	Slightly Useful	Neither Important or Unimportant	Slightly Useless	Quite Useless	Extremely Useless

1	2	3	4	5	6	7
Extremely Important	Quite Important	Slightly Important	Neither Important or Unimportant	Slightly Unimportant	Quite Unimportant	Extremely Unimportant

9. For me, attending sexuality counseling would be:

1	2	3	4	5	6	7
Extremely Useful	Quite Useful	Slightly Useful	Neither Important or Unimportant	Slightly Useless	Quite Useless	Extremely Useless

1	2	3	4	5	6	7
Extremely Important	Quite Important	Slightly Important	Neither Important or Unimportant	Slightly Unimportant	Quite Unimportant	Extremely Unimportant

The following questions require you to think about what important people in your life would think about you doing certain psychosocial and behavioral activities over the next month. Please use the following scale to guide your responses and circle the number that most accurately reflects your belief.

1	2	3	4	5	6	7
Strongly Disagree	Moderately Disagree	Slightly Disagree	Neither Agree or Disagree	Slightly Agree	Moderately Agree	Strongly Agree

Most people who are important to me think I should....

(a) attend psychological counseling	1	2	3	4	5	6	7
(b) attend social work counseling	1	2	3	4	5	6	7
(c) quit/reduced smoking	1	2	3	4	5	6	7
(d) improve my diet	1	2	3	4	5	6	7
(e) exercise regularly	1	2	3	4	5	6	7
(f) control my weight	1	2	3	4	5	6	7
(g) reduce my alcohol intake	1	2	3	4	5	6	7
(h) attend pastoral counseling	1	2	3	4	5	6	7
(i) attend sexuality counseling	1	2	3	4	5	6	7

The following questions ask you about your intentions to do certain psychosocial and behavioral activities over the next month. Please focus on what your current plans or goals are for these behaviors rather than what you think might actually happen. Please use the following scale to guide your responses and circle the number that most accurately reflects your belief.

1	2	3	4	5	6	7
Strongly Disagree	Moderately Disagree	Slightly Disagree	Neither Agree or Disagree	Slightly Agree	Moderately Agree	Strongly Agree

I intend to perform the following psychosocial and behavioral activities over the next month.

(a) attend psychological counseling	1	2	3	4	5	6	7
(b) attend social work counseling	1	2	3	4	5	6	7
(c) quit/reduce smoking	1	2	3	4	5	6	7
(d) improve my diet	1	2	3	4	5	6	7
(e) exercise regularly	1	2	3	4	5	6	7
(f) control my weight	1	2	3	4	5	6	7
(g) reduce my alcohol intake	1	2	3	4	5	6	7
(h) attend pastoral counseling	1	2	3	4	5	6	7
(i) attend sexuality counseling	1	2	3	4	5	6	7

For this next question, we would like you to indicate if you have done any of the following psychosocial or behavioral activities since your meeting with your oncologist (approximately two weeks ago).

(a) signed up for psychological counseling	**YES**	**NO**
(b) signed up for social counseling	**YES**	**NO**
(c) signed up pastoral counseling	**YES**	**NO**
(d) signed up for sexuality counseling	**YES**	**NO**
(e) quit/reduced smoking (if applicable)	**YES**	**NO**
(f) reduced your alcohol intake	**YES**	**NO**
(g) improved your nutritional intake	**YES**	**NO**

If yes, what change did you make?

_____

_____

(h) controlled your weight	**YES**	**NO**
If yes, how much weight have you lost?	_____ pounds.	
(i) exercised	**YES**	**NO**

If yes...

Duration	Times Per Week	Average
Strenuous Exercise (heart beats rapidly)	_____	_____
Moderate Exercise (not exhausting)	_____	_____
Mild Exercise (minimal effort)	_____	_____

This part of the questionnaire is needed to help understand the characteristics and medical backgrounds of the people participating in the study. For this reason it is very important information. All the information is held in strict confidence and its presentation to the public will be group data only. Also you may not know the answers to some of the medical questions. If you don't just circle "don't know" (DK). Please answer the questions to the best of your knowledge.

1. Age:_____

2. Marital Status: Never Married ___ Married ___ Common Law___

   Separated ___ Widowed ___ Divorced ___

3. Education (Please indicate the highest level attained):

   Some High School ___ Completed High School ___

   Some University/College ___ Completed University/College ___

   Some Graduate School ___ Completed Graduate School ___

4. Annual Family Income:

   <20,000____ 20—39,999___ 40-59,999___

   60-79,999___ 80-99,999___ >100,000___

5. Employment Status:

   Homemaker _____ Retired _____Part Time_____

   Full Time _____ Temporarily unemployed _____

6. Height and Weight Information:

   Weight in pounds_____ or kilograms _____.

   Height in feet/inches _____ or meters/cent _____ .

7. When were you diagnosed with breast cancer (month/year)? _____DK

8. What was the stage of your cancer at diagnosis (i.e., I, II, III) _____DK

9. Did/will your treatment include surgery (please circle)? Yes No DK

   a. If yes, what kind of surgery did/will you have? _____DK

   b. If yes, what was/will be the date of the surgery? _____DK

10. Did/will your treatment include chemotherapy (please circle)? Yes No DK

   a. If yes, when did/will it begin (month/year)? _____DK

   b. If yes, when did /will it end (month/year)? _____DK

   c. If yes, how many cycles did/will you have? _____DK

11. Did/will your treatment include radiation therapy (please circle)? Yes No DK

   a. If yes, when did/will it begin (month/year)? _____DK

   b. If yes, when did /will it end (month/year)? _____DK

   c. If yes, how many greys did/will you receive? _____ DK

12. Anything else about your cancer diagnosis or treatment that we have missed? Please add.

_____

_____

Name:_____

Phone Number:_____

(In 4 weeks time you will receive a brief phone call which will ask you questions about patient-oncologist communication in the cancer consultation, therefore if you could provide your phone number to conduct the follow-up portion of this study, it would be very much appreciated).

On this final page, please feel free to make any written comments concerning patient-oncologist communication during the cancer consultation.

Thank you very much for your participation in this research project. Please place the completed questionnaire in the envelope provided for you.

Five Week Questionnaire

Name:_____
ID:___
Condition:__

For this next question, we would like you to indicate if you have done any of the following psychosocial or behavioral activities since your meeting with your oncologist (approximately four weeks ago).

(a) signed up for psychological counseling	**YES**	**NO**
(b) signed up for social counseling	**YES**	**NO**
(c) signed up pastoral counseling	**YES**	**NO**
(d) signed up for sexuality counseling	**YES**	**NO**
(e) quit/reduced smoking (if applicable)	**YES**	**NO**
(f) reduced your alcohol intake	**YES**	**NO**
(g) improved your nutritional intake	**YES**	**NO**

If yes, what change did you make?

_____

(h) controlled your weight	**YES**	**NO**
If yes, how much weight have you lost?	_____ pounds.	
(i) exercised	**YES**	**NO**

If yes...

Duration	Times Per Week	Average
Strenuous Exercise (heart beats rapidly)	_____	_____
Moderate Exercise (not exhausting)	_____	_____
Mild Exercise (minimal effort)	_____	_____